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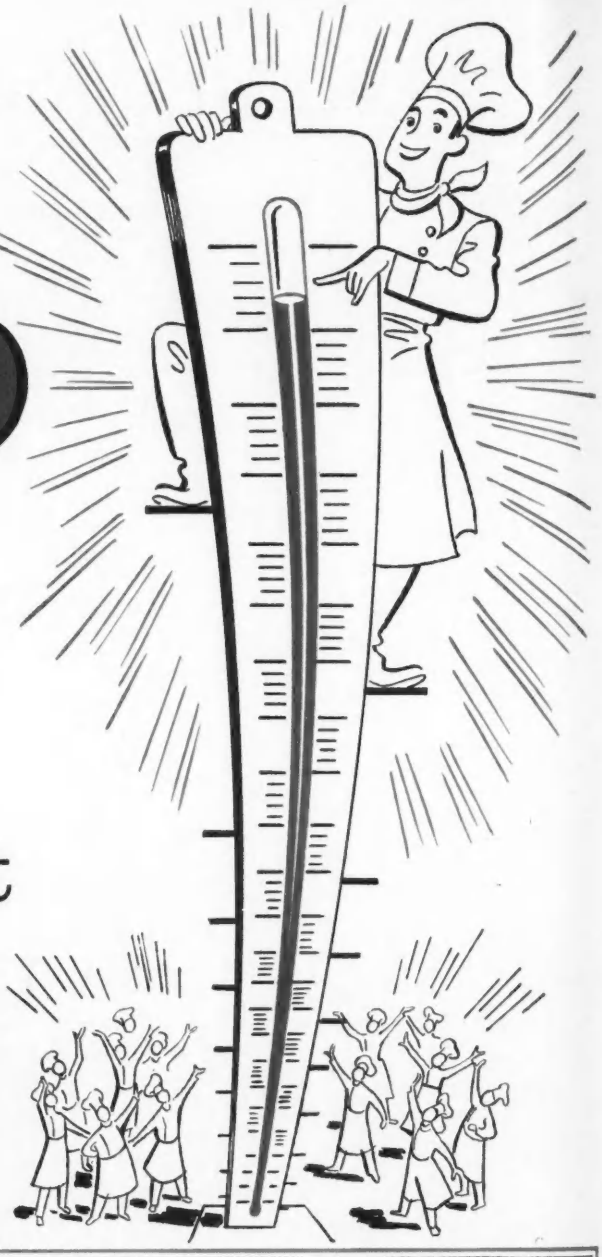

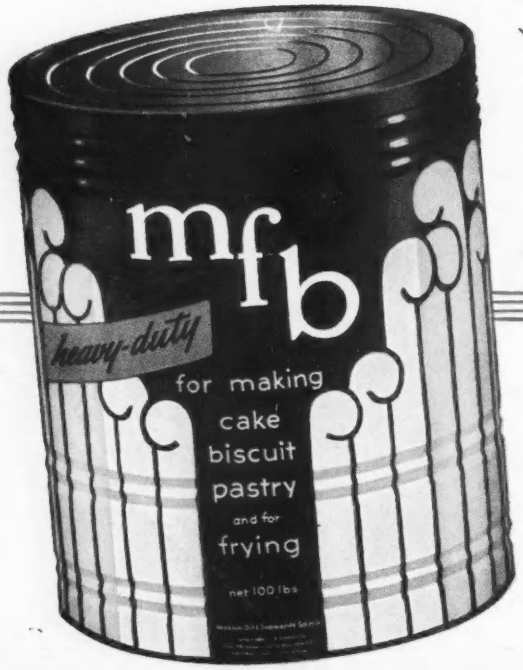

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Relation of Fat and Caloric Intake to Atherosclerosis[1]

JOHN W. GOFMAN, M.D., Ph.D., ARTHUR TAMPLIN, and BEVERLY STRISOWER

Donner Laboratory, Division of Medical Physics, Department of Physics and Radiation Laboratory, University of California, Berkeley

IN THE genesis of human atherosclerosis, the possible role of dietary factors has been suggested from two major approaches. The first type of study represents an estimation of the relation of morbidity and mortality from atherosclerosis and its clinical sequelae to geographic and ethnic variations both in the qualitative and quantitative consumption of foodstuffs. The second involves assessing the relation of the composition of the diet to certain biochemical or physiologic measurements which either are thought to be or have been demonstrated to be related to the development of human atherosclerosis.

Much suggestive evidence has accumulated from a multitude of sources that atherosclerosis is minimal in certain peoples of the world, such as the Okinawans, Chinese, and Ceylonese, who subsist on diets differing markedly from ours. Further, there have been reports both after the first and second World Wars that the clinical consequences of atherosclerosis showed a decrease in incidence in those populations of Europe deprived of part of their usual lipid and/or caloric intake. Yet this evidence has not been entirely consistent, and it has also been pointed out that other factors may have been operating to render these observations equivocal. Such studies are of great importance and deserve extension with attention to details that have rendered the earlier observations inconclusive.

Whatever the final conclusion with respect to the geographic-ethnic approach, the problem would still remain as to the possible mechanism of an effect of diet on atherosclerosis or its serious clinical sequelae, such as coronary heart disease. This leads to the second approach, namely the relation of diet to biochemical variables important for atherosclerosis and/or coronary heart disease. It is with this concept that this discussion is primarily concerned.

Before considering dietary effects themselves, it is well to examine the thesis which is the basis of the investigation of the role of diet in atherosclerosis. Much evidence, from the work in our own laboratory as well as in other centers, has now accumulated which strongly indicates that a disorder in the metabolic handling of lipids is intimately associated with, and very likely responsible for the development of atherosclerosis in the human being (1–4). More specifically, such evidence implicates the high serum content of certain lipid constituents as being the immediate aspect of the disorder, whatever the ultimate basis might be for the elevation of those lipid constituents.

The simplest hypothesis of pathogenesis (essentially suggested by Virchow) is that the atherosclerotic process is set in motion by deposition, in susceptible arterial sites, of such serum lipids. If this be the mechanism, it is reasonable to consider that, other factors being equal, the higher the blood content of the lipids implicated, the greater will be the rate of progression of the atherosclerotic process and the greater will be the likelihood of developing coronary heart disease, which is largely superimposed on coronary arterial atherosclerosis.

It becomes evident, then, that the evaluation of such a hypothesis and the development of reasonable efforts to alter the source of atherosclerosis, prophylactically and therapeutically, demand knowledge of the lipid or lipids involved, understanding of the extent to which each lipid is involved if there are more than one, and some way of combining the

[1] This work was supported in part by the National Heart Institute, U. S. Public Health Service, the U. S. Atomic Energy Commission, and the Life Insurance Medical Research Fund. Presented at the 36th Annual Meeting of The American Dietetic Association in Los Angeles, on August 26, 1953.

lipid information to provide an over-all measure of the atherosclerosis-associated lipid factors in a specific individual.

Serum lipids may be characterized by ultracentrifugation (5–7). With this technique, it has also been possible to demonstrate that a large series of lipoproteins serve as the serum transport vehicle for most of such serum lipids as fat, fatty acids, cholesterol, and phospholipid. These lipoproteins, too, are characterized in an intense centrifugal field, under defined conditions, and measured by the physical property of rate of flotation, S_f.[2] Although measurement of flotation rate of individual lipoproteins is difficult, it *is* possible to measure the sum of concentrations of all lipoproteins between arbitrary S_f limits, e.g., between S_f20 and S_f30. Such a quantity would be referred to as the concentration of the S_f20–30 class of lipoproteins. Similarly, the concentrations of other classes of lipoproteins, defined by two flotation rate limits, can be measured. The entire lipoprotein spectrum is reasonably well described if measurements are available for the classes between the limits of S_f0 and S_f400, with the exception of the two high-density lipoproteins mentioned in the footnote.

To indicate that the self-slowing which lipoproteins experience with greater concentration has been accounted for, corrected measurements are designated as "Standard" lipoprotein classes. Thus reference may be made to the "Standard S_f20–30."

QUANTITATIVE RELATION OF LIPOPROTEINS TO CORONARY DISEASE AND ATHEROSCLEROSIS

If a direct measure were available for assessing the degree of atherosclerosis or its rate of development in the living human, the problem of determining the relation of the several lipoprotein classes to atherosclerosis would be simple indeed. Such a direct measure is not known at this time. We may, however, sidestep this difficulty entirely by setting aside the effort to assess human *atherosclerosis* and by focusing on one of its most serious clinical sequelae, *coronary heart disease*. The relationship may then be determined between the lipoproteins and a property characterizing the tendency of an individual to develop clinical coronary heart disease, which may be termed "coronariness." The inference made, although not a necessary one either theoretically or practically, is that "coronariness" is directly related to coronary atherogenic potentialities.

Actually the evidence is quite good that this inferred relationship is correct (8). We have compared the levels of the Standard S_f0–12 and Standard S_f12–400 lipoproteins in a large series of documented clinical cases of coronary heart disease and a corresponding series of clinically well individuals of the same age, sex, and population type. It was found that both classes of lipoproteins are very significantly elevated in the coronary group.

The relative importance of the Standard S_f0–12 lipoproteins and the Standard S_f12–400 lipoproteins was found by the application of Fisher's method of linear discriminant analysis (9). This indicated that each milligram per 100 ml. Standard S_f12–400 lipoprotein is intrinsically 1.75 times as important in determining "coronariness" as each milligram per 100 ml. Standard S_f0–12. Further statistical work has resulted in a combined measure known as the "Atherogenic Index," or A.I. value,[3] which represents the best measure of "coronariness" obtainable from ultracentrifugation of lipoproteins.

Thus the elevated serum lipoproteins may now be transposed in terms of the A.I. values. The greater the A.I. value (which represents the best combination of the critical lipoproteins), the greater the progression of coronary disease would be expected to be. Conversely, efforts to minimize the progression of the disease would be expressed in terms of efforts to reduce the A.I. values. This transposition is important, theoretically and practically. If a particular regimen, dietary or otherwise, would lower one class of lipoproteins, while elevating the other, the clinical effect to be anticipated would depend on whether the resulting *net* A.I. value is actually lowered or elevated. We have already encountered such situations in dietary experiments (10).

PREDICTING CORONARY DISEASE

The utilization of A.I. values in considering the role of diet can best be brought into practical terms if we consider the predictive implications of the A.I. values. Such predictive implications depend in no way on the inference that "coronariness" reflects coronary atherogenic potentialities. What is desired is a way to estimate the hazard, or probability of clinical coronary heart disease developing in an

[2] The unit of measure of flotation rate, S_f (meaning Svedberg of flotation) represents a migration rate of 10^{-13} cm. per second per dyne per gram. Thus a lipoprotein which migrated in the ultracentrifuge, under defined conditions, at four times this rate would be identified as a lipoprotein of the S_f4 class. In addition to two specific lipoproteins of high density (1.075 gm. per milliliter and 1.145 gm. per milliliter), there exists in human serum an entire series, or "spectrum," of lipoproteins ranging in flotation rate from S_f2 to $S_f40{,}000$ (in sodium chloride solution of density 1.063 gm. per milliliter at 26°C.).

[3] From the theoretical development of this method, the best combination of these measurements of the individual lipoprotein class is a linear combination of the measurements with coefficients that describe the independent importance of a unit concentration of each class of lipoprotein, or the A.I. where

$$\text{A.I.} \equiv \frac{(\text{mg./100 ml. Standard } S_f0\text{–}12) + (1.75 \text{ mg./100 ml. Standard } S_f12\text{–}400)}{10}$$

(The denominator, 10, is arbitrary and is so chosen only to give a convenient numerical scale of A.I. values.)

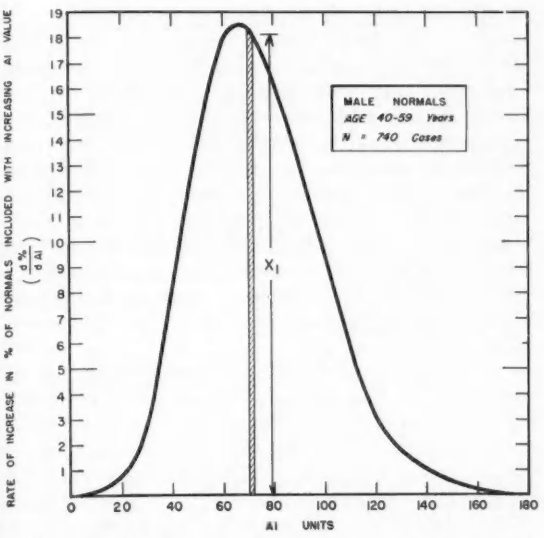

FIG. 1a. *Frequency distribution curve for Atherogenic Index (A.I.) values in clinically normal males, age forty to fifty-nine years.*

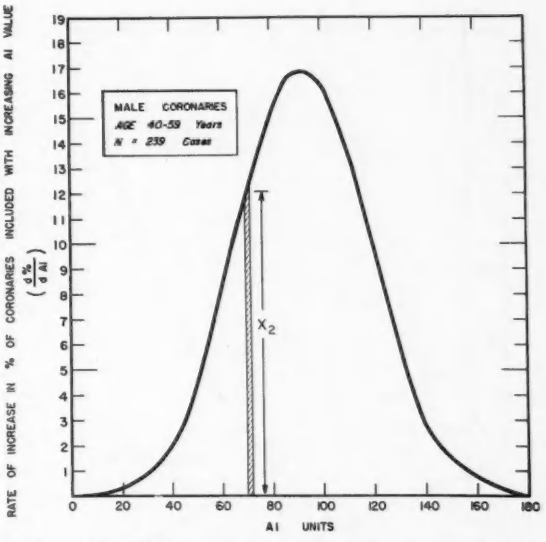
MALE CORONARIES
AGE 40-59 Years
N = 239 Cases
X2
RATE OF INCREASE IN % OF CORONARIES INCLUDED WITH INCREASING AI VALUE
AI UNITS

FIG. 1b. *Frequency distribution curve for Atherogenic Index (A.I.) values in patients with clinical coronary heart disease, age forty to fifty-nine years.*

individual with any chronic specified A.I. value. Such an estimate can be made from the distributions of A.I. values in patients with clinical coronary disease and in clinically well persons. In Figure 1 are given the distributions of A.I. values for a series of patients with coronary disease and for a series of clinically well, but otherwise comparable males. By "otherwise comparable," we mean that these subjects represent the type of population from which patients with coronary disease similar to those under study will arise. From these distribution curves, it is possible to derive information allowing prediction of the relative and absolute risks of clinical coronary disease developing in a clinically well person per year of exposure as a function of Atherogenic Index value.

From the Metropolitan Life Insurance Company data, it is estimated that about 600 deaths due to arteriosclerotic and degenerative heart disease[4] occur per 100,000 men forty to fifty-nine years old per year (11). For every fatal coronary episode, there will be approximately three which are non-fatal. Therefore, the actual incidence of new clinical coronary heart disease per year in this age group is about four times the fatal rate, or 4×600 or 2,400 per 100,000 persons per year. One may consider any small range of A.I. values, e.g., 70–72. In Figure 1a, out of 100,000 clinically well males, the proportion who will have an A.I. between 70 and 72 is given by the ratio of the shaded area A_1 to the total area under the distribution curve, A. In absolute numbers, there will be $100{,}000 \times \frac{A_1}{A}$ persons who fall in this range. In the representative population of patients with coronary disease (*Fig.* 1b), the proportion of persons in this same range of A.I. values will be the ratio of the shaded area A_2 to the total area A. Since 2,400 cases of coronary disease are expected out of 100,000 in one year, the actual number of cases with A.I. values between 70 and 72 will be $2{,}400 \times \frac{A_2}{A}$. Thus the probability of an individual in the A.I. range of 70 to 72 developing coronary disease in one year is $\frac{2{,}400 \times A_2/A}{100{,}000 \times A_1/A}$. It is readily seen that the area $A_1 = 2\ x_1$, and $A_2 = 2x_2$; hence $\frac{A_2}{A_1} = \frac{x_2}{x_1}$. As we narrow the range of A.I. values, this becomes rigorously correct.

In an entirely analogous fashion, an evaluation of the probability of coronary disease occurring in one year can be made for every A.I. value over the entire range encountered, and such probabilities may be plotted on a single curve, as shown in Figure 2, as a function of A.I. value. It is to be noted that the absolute magnitude of the probability is determined by the incidence rate of clinical coronary disease per year per 100,000 individuals. If that rate were changed to any other value, the entire curve would be shifted to higher or lower values, *but* the relative positions of the points on the curve and the general shape of the curve would be uninfluenced. Thus, no matter what the absolute incidence of clinical coronary occurrences per year is, the relative hazards predicted for two individuals with differing A.I. values will be those obtained

[4] It may be assumed that this represents, in the main, coronary heart disease.

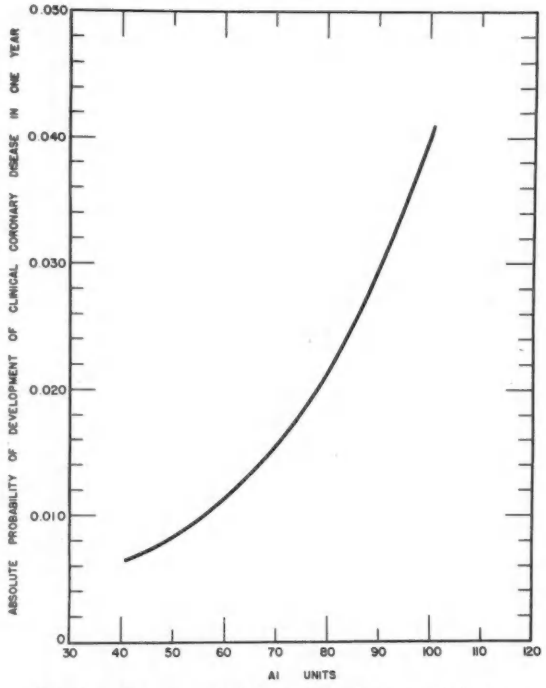

FIG. 2. *Absolute probability of developing clinical coronary heart disease per year as a function of A.I. value in forty- to fifty-nine-year-old men.*

through the use of the curve shown in Figure 2.

In actual use, an illustrative example may be considered. For persons whose A.I. is 60, the probability from Figure 2 is 0.0115. For individuals with A.I. values of 100, the probability from Figure 2 is 0.0405. Expressed otherwise, for every 100,000 clinically well individuals of this age range whose A.I. is 60, 1,150 may be expected to develop clinical coronary disease within one year. For 100,000 clinically well individuals whose A.I. is 100, 4,050 may be expected to develop clinical coronary disease in one year. The individuals with A.I.'s of 100, therefore, carry three and a half times the risk of individuals with A.I.'s of 60.

Such predictive information as that of Figure 2 is most useful in considering A.I. values in relation to such possibilities as dietary prophylaxis or therapy of atherosclerotic coronary heart disease.

RELATION OF WEIGHT AND A.I.

It would probably not be contested by many that the immediate cause of overweight in a population such as ours is overeating. Unfortunately, overeating is a mixed phenomenon in that the specific foodstuff (i.e., fat, carbohydrate, or protein) responsible for the excessive caloric intake may vary considerably from person to person. Broadly, it may be anticipated that a high caloric intake will be associated with an elevated fat intake, although in specific cases this need not be so. However, as a result of the broad association of high fat intake with high caloric intake in habitual diets, it will be true that any relationships established between overweight and disease will not allow directly a determination of the relative importance of calories *per se* vs. total fat or other dietary constituent. Further, many studies involving dietary restriction suffer from this type of limitation, since low caloric diets have been, in general, low-fat diets. Thus studies of overweight itself need supplementation by controlled experimental dietary studies where, to the best of our abilities, only one variable is shifted at a time.

There has been some controversy about the relation of overweight to the development of clinical coronary heart disease. The recent report of Dublin and Marks (12) showing excessive mortality from heart disease (including in large measure coronary disease) in obese individuals would seem to leave little reason to doubt this relationship. Also, autopsies demonstrate excessive coronary artery atherosclerosis in overweight persons as compared with those who are not overweight (13, 14). Consideration of these two types of evidence would lead one to conclude that a positive association between coronary disease and overweight does exist. But, this serves only to open the problem for consideration, since it tells us nothing about the mechanism by which overweight operates in producing excessive morbidity and mortality from coronary heart disease.

Much has been said and written, both in the lay and medical press, about the "strain" on the heart of the physical burden of carrying the body fat. This may be referred to as the "excess baggage" hypothesis of the relation of obesity to coronary heart disease. To our knowledge, there is little, if any, scientific evidence available to support this hypothesis.

In the preceding discussion, it was shown that the probability of developing coronary heart disease rises with increasing A.I. values. It, therefore, is of great interest to determine the relation of the A.I. value to degree of overweight. We have previously done this (8), obtaining the results reproduced in Figure 3.[5] For both sexes and for the age range thirty to sixty years, in clinically well individuals, average A.I. values rise with increasing degree of overweight. This relationship may be assessed to determine whether the extent of the A.I. rise with overweight is sufficient to account quantitatively for the excessive mortality from coronary disease, as observed by Dublin. For such a com-

[5] Relative weights in Figure 3 are determined by dividing actual weights by the ideal weight for a given individual. Ideal weights are taken as those for medium frame persons from Metropolitan Life Insurance Company charts.

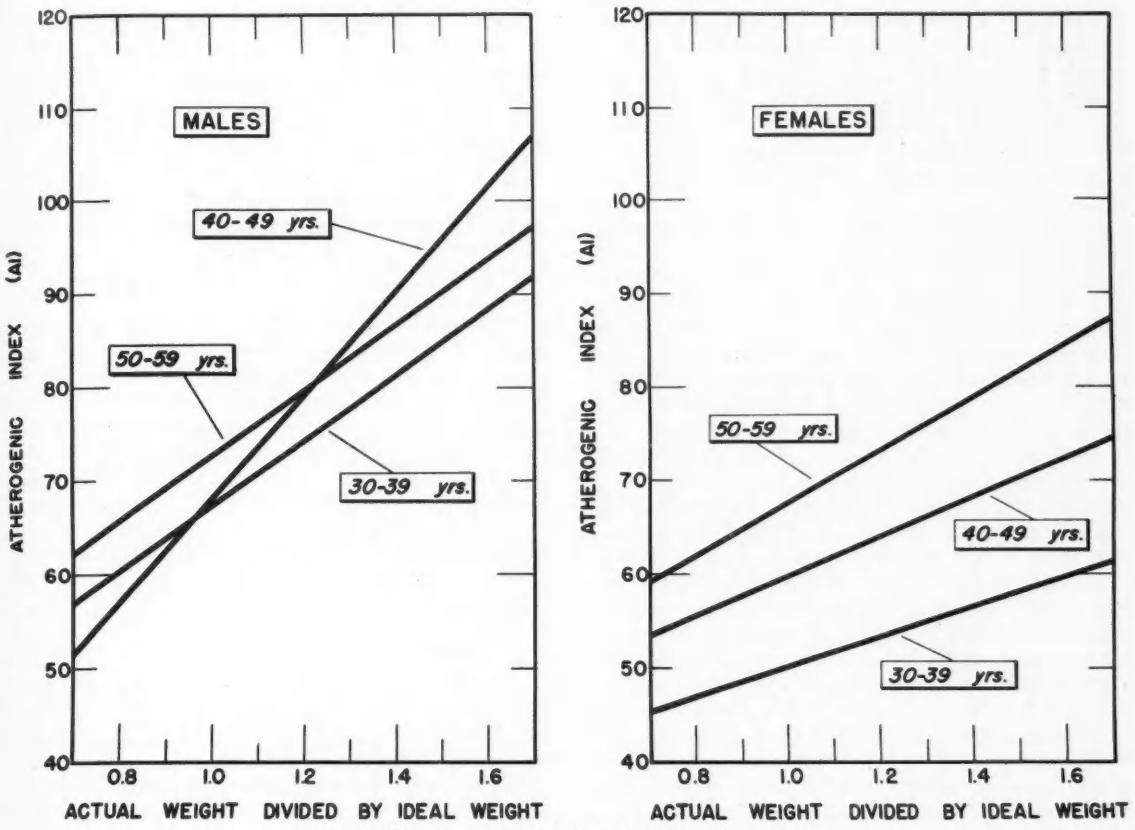

FIG. 3. *Change in A.I. with deviations from ideal weight.*

parison the data in Figure 3 are utilized as follows for men between forty and fifty-nine:

Mean A.I. value at ideal weight = 71
Mean A.I. value at 40 per cent overweight = 88

These A.I. values correspond to the following probabilities in Figure 2:

For A.I. of 71, probability of coronary disease = 0.0164
For A.I. of 88, probability of coronary disease = 0.0284
The relative risk for persons 40 per cent overweight as compared with those of ideal weight becomes $\frac{0.0284}{0.0164}$, which is 1.7 times.

The tables of Dublin and Marks indicate that the over-all mortality from chronic heart disease (in large measure coronary heart disease) is one and a half times as high in persons 40 per cent above ideal weight when compared with that for those of normal weight. Even though their tables do not segregate coronary disease as distinct from other chronic heart disease, the estimate made from the A.I. values can be regarded as being in very good agreement with the actuarial data. Indeed, the agreement is good enough that, unless proved otherwise, extraneous hypotheses involving unknown or mysterious factors are uncalled for in explaining the association of obesity with excessive coronary heart disease.

PREVENTING AND TREATING HEART DISEASE

Before turning to the question of possible mechanisms underlying the association of elevated A.I. values with overweight, several pertinent issues with respect to the implications for prevention and treatment of heart disease deserve elaboration.

The population of forty- to forty-nine-year-old men shows a mean A.I. value of 74 and a mean relative weight of 1.11 (i.e., the average individual weighs 11 per cent more than his ideal weight). If this population universally reduced to the extent that the average relative weight became 1.0, the predicted mean A.I. value would become 68. Then, from Figure 2:

For an A.I. of 74, probability of coronary disease = 0.018.
For an A.I. of 68, probability of coronary disease = 0.015.
Thus, at an A.I. of 68, the probability of coronary disease developing is 83 per cent $\left(\frac{0.015}{0.018} \times 100\right)$ of that at 74.

For every 100,000 deaths due to coronary disease in this age bracket, it could be predicted that 17,000 would be prevented if the average weight were pulled down to the ideal. Obviously, this would still leave far too many deaths due to coronary disease, but it would represent a major inroad in our efforts to solve this problem, heretofore viewed with much gloom.

These considerations are for *average* populations. The considerations for individual cases are somewhat different. First, it must be stated that, whereas the *average* A.I. value rises with increasing overweight, many individuals do not fit this average pattern. Another way of stating this is that the correlation coefficient between degree of overweight and A.I. value is low, although definitely significant. Other factors obviously are also operative in accounting for elevation in A.I. values. Underweight individuals with elevated A.I. values are not rare, and conversely, there are many overweight persons with low or moderate A.I. values. On an individual basis, it would seem unlikely that weight reduction *per se* would be very effective in reducing the elevated A.I. value in a person already underweight. And, there would not be much reason to consider that weight reduction would be indicated (for coronary disease, at least) in an overweight person whose A.I. value is already low. In the first place, such an individual already has a low probability of developing coronary heart disease, and in the second place he is one where the *average* relationship between overweight and A.I. elevation does not operate.

Thus, a much more intelligent approach to individual prevention and therapy via overweight correction can be made if obese persons are first classified as to their A.I. levels. The most fruitful prophylactic and therapeutic prospects would appear to reside in those overweight individuals with high A.I. values. They are inordinately likely to develop coronary disease because of their elevated A.I. values. The steepness of the A.I. vs. the probability curve (*Fig.* 2) at high A.I. values indicates that even small reductions in A.I. will result in reasonably large reductions in the likelihood of clinical coronary heart disease occurring.

WEIGHT REDUCTION IN ESTABLISHED CORONARY DISEASE

Prophylaxis and therapy of coronary disease via reduction in A.I. levels through weight reduction present two separate problems. In the clinically well person who is studied early in life, say before forty years of age, the correction of overweight and lowering of A.I. value can be anticipated to provide almost as good an expectancy as if he had always maintained ideal weight, provided he manages to avoid coronary disease in the first several years following weight correction.

However, in the person with established coronary disease, it must be realized that, in general, moderately advanced or severe coronary artery atherosclerosis is present. Thus, although weight reduction will lower the A.I. value, it would not be reasonable to expect that such a person will actually enjoy fully the lowered probability of further coronary disease which corresponds to the lowered A.I. value. His *accumulated* coronary atherosclerosis may still lead to recurrent coronary occlusion, even though his new *rate* of accumulation of atherosclerosis is lower.

This point is important, for it will aid in understanding the realistic prospects in dietary therapy. Miraculous protection is not to be expected by lowering the A.I. value in the face of established, advanced coronary disease. Certainly some lowering of the risk of new coronary disease can be anticipated, but not the degree that would have been obtained by correcting overweight before advanced coronary artery atherosclerotic narrowing occurred. This is probably a very real situation where the adage, "An ounce of prevention is worth a pound of cure," applies.

MECHANISM OF RISE OF A.I. VALUES IN OBESITY

Thus far it has been pointed out that the diet of the American population in becoming and remaining overweight is associated, in an average sense, with elevation of the A.I. value. Such a diet provides an excess of calories over that required to maintain ideal weight. However, this by no means infers that calories *per se* represent the offensive agent in elevating serum lipoprotein levels, and, consequently, A.I. values. Fat intake, *on the average*, rises with caloric intake. Hence, overweight in general is associated with both excessive fat and excessive caloric intake. It then becomes a problem to determine which of the three following major possibilities account for the rise in A.I. values in overweight people:

(a) Excess fat intake leads to elevation of A.I. values.

(b) Excess caloric intake *per se* leads to elevation of A.I. values.

(c) Some metabolic feature of the obese state itself leads to elevation of A.I. values.

It is not easy to design unequivocal experiments which isolate these three possibilities for testing. However, some data are available to evaluate possibility (a) rather definitively. Both our own data and those of other investigators using other serum measurements indicate that a lowered fat intake *per se* can result in lowered A.I. values (8, 15–17).

One type of experiment to demonstrate this relationship consists of the utilization of a diet restricted in total fat intake but supplemented with calories from carbohydrate, primarily, so that the

patient does not lose weight. Essentially this keeps the patient isocaloric in food intake. Under controlled conditions we have performed such an experiment.[6] The results in two cases are presented in Table 1, since they illustrate not only the effect of lowering fat intake *per se*, but also the variability in response for different individuals. The two subjects had elevated A.I. values, the first having most of the A.I. elevation due to lipoproteins of the Standard $S_f12–400$ class, the second having most of the elevation due to the Standard $S_f0–12$ lipoproteins. The actual data are presented in Table 1.

TABLE 1
Effects on S_f values and A.I. of low-fat diet in two subjects*

TIME OF TEST	STANDARD S_f 0–12	STANDARD S_f 12–400	A.I.
Twenty-Five-Year-Old Man, Clinically Well			
	mg./100 ml.	*mg./100 ml.*	
Prior to diet	378	1133	237
4 weeks on diet	320	616	140
6 weeks on diet	311	636	142
Fifty-Two-Year-Old Woman with Xanthoma Tendinosum			
Prior to diet	1340	672	251
4 weeks on diet	1190	358	182
8 weeks on diet	1235	382	191

* 20 gm. total fat.

Both patients started the low-fat diet with nearly the same massive elevations of the A.I. value and their weights remained essentially constant (±3 lb.). In neither case did the diet effect any striking reduction in the Standard $S_f0–12$ value. In both cases there was approximately a twofold lowering of the Standard $S_f12–400$ lipoproteins, which in turn lowered the A.I. These drastic lipoprotein and A.I. lowerings do not occur in all patients placed on a low-fat diet. In some, especially where the initial lipoprotein levels are low, there may be almost no change. The important issue involved here is that lipoprotein levels can be lowered in some persons by restriction of total dietary fat, even though the total caloric intake and body weight are essentially unaltered.

Thus it has been demonstrated that the lowering of fat intake, at an isocaloric level, leads to lowered A.I. values. Since obesity is usually associated with excessive fat intake, the elevated average A.I. values characteristic of obese persons can, at least in part, be the result of the excessive fat intake. The fact that overweight can be due more to excessive intake of nonfat calories may, indeed, partially explain why the relation of overweight to elevated A.I. values is at times not of a very high order. If nonfat calories do not lead to excessive A.I. values, then obese persons overeating in nonfat calories would not be expected to show the same elevation in A.I. values that might have been produced by an equivalent number of fat calories.

What is the evidence with respect to the effect of calories *per se* irrespective of origin? We have studied human subjects ingesting a low-calorie (and low-fat) diet, during which many experienced a lowering of lipoproteins and A.I. value (15). However, such experiments were inconclusive for two reasons: first, the fat content of the diet was also lowered, and second, the patient was in a state of *negative* caloric balance. No inference can be drawn for persons in a steady state from data for individuals in *negative* caloric balance. For the same reason, the studies of Walker *et al.* (18) with patients on a low-fat, low-calorie diet are of no aid in learning the effect of calories *per se* on lipoproteins.

They attempted to answer this by another inconclusive experiment, namely forced feeding of a very high caloric diet, utilizing carbohydrate as the calorie source. In that experiment, lipoprotein levels rose. However, the subjects were in a state of *positive* caloric balance during the experiment. Hence their results are again inconclusive with respect to the effect of calories in the steady state.

Thus it must be stated that there is no valid evidence at present that calories *per se* in an individual in a steady state (i.e., not losing or gaining weight) affect the lipoprotein or A.I. values. It would indeed be desirable that this question be answered in the future. A valid experiment could be done by studying a group on a diet which does *not* alter their fat intake from the habitual intake but which either raises or lowers their caloric intake from nonfat sources. If, *after* they have equilibrated to their new weight (depending on their revised caloric intake), there would be a significant shift from the original A.I. value, one would then have evidence that caloric intake *per se* is a factor.

The third possibility, that of a metabolic disturbance associated with obesity itself, is essentially unevaluated. In all likelihood, this could be better studied after the issue of the effect of calories *per se* is determined, since it may prove difficult to dissociate an effect due to calories alone from that due to metabolic peculiarities of obesity itself.

Thus, of several possible explanations for the association of elevated A.I. values with overweight, there exists positive evidence only for their relationship to fat intake. Evidence implicating factors other than fat intake are at this time equivocal at best. On the other hand, there is by no means conclusive evidence that elevated fat intake is the *sole* operative mechanism in the elevation of lipoproteins in obesity.

FACT, FALLACY, AND FANCY

For some reason, the literature with respect to diet in relation to serum lipids is rife with misstatement, erroneous notions, and outright distortions.

[6] As part of a long-term dietary study in collaboration with Virginia Dobbin, Senior Dietitian, The Cowell Memorial Hospital, University of California, Berkeley.

The more common illustrations deserve specific comment.

First, one repeatedly encounters the statement that dietary lipids, such as cholesterol and fat, cannot possibly influence serum lipids or lipoproteins "because the human body is capable of synthesizing fats and cholesterol from such small molecule precursors as acetate or other two carbon fragments." One would have to be completely oblivious to the developments of tracer physiology and biochemistry of the past decade to deny that the body can perform such syntheses. There is nothing at all incorrect about such a statement except that it is *wholly irrelevant* to the issue at hand, namely, whether dietary lipids can alter serum lipoproteins. The absurdity of the original statement above would be evident if the underlying logic were followed through a little further. For example, utilizing such logic, one could conclude that the injection of insulin in a normal person could have no possible physiologic effect because the body makes insulin. One could conclude that similar statements could be made for thyroxin, cortisone, ACTH, estrogens, androgens, and a host of other substances of physiologic interest. It is doubtful that those who make this erroneous statement about dietary lipids would make the same statement for the other substances.

Probably some further clarification of this particular problem could be obtained by a consideration of the blood lipids, tissue lipids, and dietary lipids. Figure 4 shows a schematic representation of possible transfers of lipid substances.

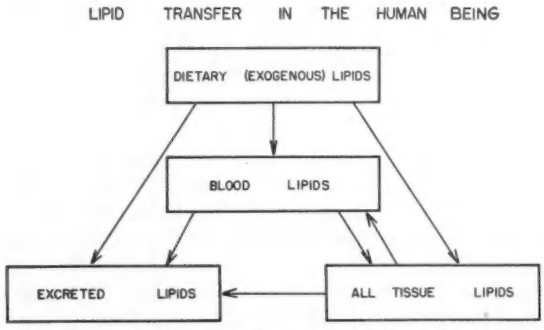

FIG. 4. *Level of blood lipids is influenced by alterations in diet, tissue metabolism, and excretion only insofar as these alterations result in a* net *transfer of lipids into or out of the blood compartment.*

For example, one may consider a person with 30 lb. (13,600 gm.) fat stored in one or another tissue site. Even with a highly elevated lipoprotein level, few individuals would have more than 25 gm. fat circulating in the *entire* blood compartment. The blood holds, then, in such a case, approximately 0.2 per cent of the total body fat, an amount which occupies the central interest with respect to the relationship of lipids to atherosclerosis, since there is strong and growing evidence that the *blood* lipids are directly associated with the development of this disease. Therefore, changes in the large mass of tissue lipids may be expected to be of consequence with respect to atherosclerosis only insofar as they reflect themselves in an altered *distribution* of lipids between the blood compartment and the tissue compartment. It is with changes in the 0.2 per cent of the lipids rather than in the 99.8 per cent that atherosclerosis may be expected to be concerned. *A priori*, there is no reason to believe that the turnover, gain, or loss of *pounds* of lipids in the tissues need necessarily influence the 25 gm. in the blood compartment. Obviously, should *experiments* indicate that the lipid content of the blood does shift with turnover in tissues, then such turnover would become of interest with respect to atherosclerosis. Such experimental evidence rarely underlies the broad statement concerning the significance of body synthesis and destruction of lipids with respect to the blood *content* of lipids in the steady state.

A second subject widely misunderstood and confused in the literature is that of the relative role of animal vs. vegetable fat and, as a corollary, the significance of the dietary cholesterol content as opposed to the dietary fat content. Geographic studies have, in general, implicated a high *animal* fat intake in association with excessive atherosclerosis and coronary disease.

However, direct experimental studies in human beings, both in our own investigations and those of others, show that in relatively short-term experiments (days, weeks, and months), fat both of vegetable and animal origin must be restricted simultaneously to obtain lowering of serum lipoprotein in those persons who respond to lowered fat intake (15–17). When fats of animal and vegetable origin are restricted and a lipoprotein lowering is achieved, the reintroduction of vegetable fat alone to the diet will generally result in a rise of the serum lipoproteins toward the pre-dietary level. The data at present are not adequate to state that animal fat and vegetable fat are entirely equivalent in this regard, but certainly it is clear that vegetable fat will cause a rise in levels in many individuals whose lipoproteins have been depressed by *total* fat restriction.

The concern over animal fat is the result of its content of cholesterol, which is absent in vegetable fat. In animal experimentation, it is well established that the dietary cholesterol is crucial in elevating lipoproteins and producing atherosclerosis. It must be remembered, though, that in animal studies the dose of cholesterol, approximately 0.25 gm. per day per kilogram body weight, would represent a human dose of the order of 18 gm. per day for a 70-kg. man. Such quantities are not encountered in the human dietary. Hence, the statements that the result of cholesterol ingestion in the human subject is differ-

ent from that in the rabbit are loose and inaccurate and based on inadequate data. Of interest in experimental rabbit work is the observation that if the dose of cholesterol per day is reduced, the time required to elevate the serum lipoprotein to highly atherogenic levels can be markedly prolonged, from several days to months. This situation is more comparable to that which pertains to human nutrition. By direct human study over an adequate time period, there exist no good data to answer the question, affirmatively or negatively, of whether a high-fat:high-cholesterol intake may elevate serum lipoproteins more than will an equivalently high-fat diet from which cholesterol is omitted. Thus the specific role of cholesterol, at a given level of fat intake is unknown at this time.

The dietitian must constantly be on guard for another loose, deceiving statement often encountered in the medical literature. From the statement that reduction of cholesterol intake, *without* reduction in fat intake will not alter serum lipids in acute dietary experiments, several writers have drawn the broad conclusion that low-*lipid* diets cannot possibly be useful in lowering serum lipids or lipoproteins. Whether this error is made wilfully or through ignorance, the fallacy in it is of major importance. A low-*cholesterol* diet is not necessarily a low-*lipid* diet, and conversely a low-*fat* diet is not necessarily a low-*cholesterol* diet. To our knowledge, no significant claims are being made for low-cholesterol diets with respect to efficacy in lowering serum lipids, but rather for low-fat diets or low-fat:low-cholesterol diets. Hence it should be obvious that failure to obtain lowering of serum lipids on a low-cholesterol:*high-fat* diet in no way invalidates observations made either with a low-fat diet or a low-fat:low-cholesterol diet.

Further evidence quoted that the cholesterol content of the diet cannot influence serum lipid levels consists of the observations that elevation of cholesterol intake may suppress cholesterol synthesis in such an organ as the liver (19). Even though this has not been demonstrated to be true in all types of human beings, we may follow the logic through by assuming it has been demonstrated to be so. These observations may still remain entirely irrelevant with respect to serum levels of lipids or lipoproteins, since no one has demonstrated that the rate of cholesterol *synthesis* need necessarily have anything to do with the serum lipoprotein *level*. Thus, reasoning that suppression of cholesterol synthesis resulting from high-cholesterol intake will leave unaltered the serum cholesterol or lipoprotein level cannot be accepted.

DIETARY LIPIDS IN LOWERING SERUM LIPOPROTEINS

We have shown that in at least part of the human population the restriction of dietary fat will result in the lowering of certain classes of lipoprotein levels and of A.I. values. It is important to point out the empiric and primitive state of our understanding of this phenomenon. The observation itself does not appear to be subject to reasonable doubt. However, no good evidence has yet accumulated to suggest the mechanism by which the effect is achieved. The question arises as to whether the effect is being achieved by restriction of the fat itself or by restriction of some as yet unidentified dietary constituent associated with dietary fat.

These questions are crucial. For example, in dietary fat, there exist fats containing saturated fatty acids of differing chain lengths, and, further, unsaturated fats with one, two, or more double bonds in the molecule. It would indeed be important to know whether the composition of dietary fat with respect to such variations in fatty acid content is significant in determining its effect on serum lipoproteins. Studies directed toward answering these questions will probably require carefully controlled, long-term observations with partially synthetic diets. Such studies will undoubtedly be difficult, but they are vital if the crucial answers are to be obtained, if the observations on the effect of dietary lipids on serum lipids are to be removed from the empirical realm into some systematic understanding on a more fundamental basis. Undoubtedly our abilities to use diet wisely for prophylaxis and therapy in human atherosclerosis will be materially enhanced with progress in that direction.

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BIOGRAPHICAL NOTES FROM THE HISTORY OF NUTRITION

William Harvey—April 2, 1578–JUNE 3, 1657

The early part of the seventeenth century was a thrilling period in sea voyages (the *Mayflower* landed at Plymouth), in literature (Shakespeare's plays were produced in London), and in science (the circulation of blood was discovered).

Until that time, it was believed that the liver was the center of the blood system, the heart warmed the blood and the lungs cooled it, the pulse was the same as respiration, and blood passed directly from the right to left side of the heart. William Harvey was the man who reasoned, measured, and experimented and gave to the world the evidence for the circulation of blood. Thus was made possible for the first time an understanding of the nutrition of the body, and the way was open to study the true function of the lungs. Harvey made his discovery because he was the first to measure quantitatively what happens in the body.

Valves were known in the arteries and veins; by tying a cord around the arm, Harvey found the blood collected in the artery on the side of the cord nearest the heart and in the veins on the side away from the heart. He measured the quantity of blood in the body, and found that it was not sufficient to allow a continuous flow in the arteries from the heart unless that same blood was brought back to the heart again. Simple, carefully planned experiments verified all of his conclusions that the blood must circulate. In 1628, some nine years after his first experiments, he published in Latin his classic work, *An Anatomical Disquisition on the Motion of the Heart and Blood in Animals.* It consisted of seventy-two pages and two plates of diagrams. This was the greatest discovery of physiology; it revolutionized medical thinking and teaching and laid the foundation for modern science.

William Harvey was born April 2, 1578 in Folkestone, Kent, the eldest of seven sons. He went to King's School in Canterbury, then to Cambridge (1593–97) and on to Padua to study medicine. He returned to London in 1602; obtained his medical degree from Cambridge; married the daughter of a King's physician (1604); became physician to St. Bartholomew's Hospital (1609) and physician to James I (1618); and was appointed lecturer in anatomy at the College of Physicians. The notes for one of his lectures still exist in their original manuscript and binding in the British Museum; they are closely written in Latin on 6 by 3¾-in. pages. He built a library for the College of Physicians and willed it his books and papers.

He was short and slight in build, round faced with an olive complexion and black eyes and hair. He was reserved and uncommunicative and is said to have read a book on anatomy while a battle between the Royalists and Parliament forces went on around him. He died on June 3, 1657 in his seventy-ninth year.

Complete proof for his theory of circulation was not obtained until the further development of the microscope by Leeuwenhoek (1632–1723), who described the red blood corpuscles, and the careful studies of the Italian, Marcello Malpighi (1628–1694), who first saw the capillaries in the lungs of a frog.

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Sodium Values of Seven Frozen Vegetables[1]

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RECENT years have brought many changes in the low-sodium diet as it is used in the treatment of cardiovascular and renal diseases. Most hospitals have patterns set up for 200-mg., 500-mg., and 1-gm. sodium diets but are always looking for ways to improve the foods served. Since more frozen foods are being used, many have wondered if it would be possible to use them in low-sodium diets so that purchasing and cooking procedures would be simplified. The literature and food composition tables did not yield much information on the subject, although it seemed that the chief objection to using frozen foods in a low-sodium diet was based on the fact that the food often had a higher sodium content in the frozen state. To obtain more information, a study was carried out at The Ohio State University Hospital in which various brands of some of the frozen vegetables used on the regular menus were analyzed to determine their sodium content.

PROCEDURE

Since the results were applicable for both hospital and out-patients, the vegetables analyzed were selected on the basis of their use in the hospital and their availability on the Columbus market. Samples of nationally distributed brands were obtained from local wholesale and retail dealers. Two packages of the six brands of each of the following vegetables were analyzed for their sodium content: asparagus, broccoli, cauliflower, green beans, Lima beans, peas, and spinach. The brands were divided into two institutional packs (package weight of 2 to 3 lb.) and four commercial packs (package weight of 10 to 14 oz.).

Sampling was done while the vegetables were in the frozen state, and a 100-gm. representative sample was obtained. This sample was homogenized in a Waring Blendor with small amounts of double distilled water, after which 10-gm. aliquots were taken from the homogenized mixture. The aliquots were ashed by a modification of the Visscher nitric acid extraction method (1), diluted to a known volume, and the sodium content determined with the aid of a flame photometer. Questionnaires were sent to the processors whose brands were analyzed to obtain information on the processing methods which could affect the sodium content of the frozen product.

RESULTS

The average sodium content for the six brands of each frozen vegetable may be seen in Table 1, as well as a comparison with the values obtained by other workers using the same method. The most striking fact noted was variation in sodium content in the various vegetables. Frequently there was a wide variation among the various brands of a vegetable and even between two samples of the same vegetable. In the case of broccoli, this variation may have been due to different amounts of buds and stems in the various brands.

Lima beans and peas had higher sodium contents than the other vegetables. From the replies to the

TABLE 1

Sodium values of certain frozen vegetables reported by three investigators

VEGETABLE	NUMBER OF SAMPLES IN THIS STUDY	SODIUM		
		This study*	Bills *et al.* (2)	Irwin and Schuck (3)
		mg./100 gm.	*mg./100 gm.*	*mg./100 gm.*
Asparagus	10	1.89	3.00	8.8–17.2
Broccoli				
Buds	12	19.94	13.00	16.8–20.0†
Stems				36.8–38.4†
Cauliflower	12	16.22	22.00	
Green beans	12	1.26	2.00	
Lima beans	12	151.49	310.00	
Peas	12	129.95	100.00	21.5–24.5
Spinach	12	42.41	60.00	

* All samples frozen. All values are means of six analyses.

† These are the tabulated results given for broccoli. Since the authors stated that they analyzed frozen broccoli, these figures were used as values for the frozen product.

[1] The data reported here are condensed from the thesis of Harriette Thomas presented in partial fulfillment of the requirements for the degree of Master of Science. Received for publication January 25, 1954.

questionnaires, these high values seemed to be due to the brine separation used in preparing these vegetables for processing. Brand VI (a commercial pack) had the highest value for both Lima beans and peas.

The replies to the questionnaires indicated that the vegetables for freezing were obtained from all parts of the United States, with about one-fourth coming from California. All packers used brine separation in processing Lima beans and peas. Two used sodium detergents in cleaning the vegetables, and two used soft water in their processing operations. The packers stated that they did not use lye-peeling or other salt solutions in processing, and neither salt nor monosodium glutamate was added. None of the packers knew the sodium content of the water used in processing.

The analytical results were evaluated in terms of the vegetable lists established for low-sodium diets in the Ohio State University Hospital Diet Manual (4). Frozen asparagus, broccoli, cauliflower, green beans, and spinach had values which were within the range of Group A (0.2 to 24.0 mg. per 100 gm.) and could be used on the 200-mg. and 1-gm. sodium diets. Frozen Lima beans and peas had values which were much higher than those of any of the vegetables on the lists, so that it was felt that fresh Lima beans and peas, rather than frozen, should be used on low-sodium diets.

CONCLUSION

Although a general conclusion as to the use of the vegetables analyzed was reached, it should be noted that this conclusion has definite limitations. Not only must the variations which were encountered in this study be considered, but also the variations which occur from year to year in a particular pack. It is probable that these variations would not make any appreciable difference in the average sodium-restricted diet and that the food composition tables which are generally used can furnish an estimate of the sodium content of the frozen vegetable. For exact values, as would be needed in a metabolic study, the food itself would have to be analyzed.

There is still a lack of information on the sodium content of many foods.

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Watch the Clock When Cooking Root Vegetables

"Cook until just tender" is a good rule for root vegetables. The Bureau of Human Nutrition and Home Economics, U.S.D.A., has prepared the following guide for boiling times for best flavor and nutritive value:

Vegetable	*Minutes to Boil*
Beets	
Young, whole	30–45
Older, whole	45–90
Sliced or diced	15–25
Carrots	
Young, whole	15–25
Older, whole	20–30
Sliced	10–20
Onions	15–30
Parsnips	
Whole	20–40
Quartered	10–20
Rutabagas, cut in pieces	20–30
Turnips	
Whole	20–30
Cut in pieces	10–20

Vegetables should be started in boiling water in a covered kettle. For tender young root vegetables, only enough water to prevent sticking to the pan is advised; for older vegetables, either whole or cut, there should be enough water to cover. For seasoning, ½ tsp. salt should be added to the water for four servings. After the vegetables are placed in the boiling water, the water should be brought back to boil quickly, the heat turned low, and the vegetables cooked gently.

To retain vitamins, as well as for variety, the Bureau suggests leaving skins on small root vegetables. Beets will keep their bright red color if cooked in the skin with an inch or two of taproot and stem left on.

Appetites and Attitudes

A Viewpoint on Feeding the Young Child[1]

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This little boy is enjoying individual self-service in the nursery school

WHEN applied to her own youngster, the term "adequate diet" can be a fighting one to the young American mother. She has heard so much about the nutritional deficiencies in childhood that result in illness and lessen optimal development that food has become a moral issue. She evaluates herself as a parent partly in terms of the adequacy of young Johnny's food intake. She is a good mother if Johnny drinks his glass of milk, a bad one if he turns thumbs down on that lovely green broccoli. She becomes insistent on getting certain foods into Johnny by fair means or foul. Food refusals are met by cajoling and coaxing, threatening and pleading, bribing and arguing. These tactics become a part of the daily menus at breakfast, lunch, and dinner. However, Johnny usually responds by becoming more adamant, and his food refusals, instead of decreasing, grow and multiply. He enjoys thoroughly all this extra attention, not to mention the excitement and exhilaration. Each meal becomes a war of wills, and the honors usually go to Johnny.

Perhaps it is in this area that we, as professional people, need to intervene. We beat the drums for ascorbic acid, blow the horns for the high-protein breakfast, and sound cannons for the daily quart of milk. But what if Johnny doesn't like orange juice, eats only a skimpy toast and marmalade breakfast, and prefers cowboy cola drink to that tall, cold tumbler of milk? Have we given parents the tools to utilize knowledge about nutritional needs in a way to prevent such situations from arising or to handle them when they do arise?

Today we are certain of the kinds of food that will further a better development in children than has yet been possible. In the last four decades, the growth of knowledge about nutritional needs has been phenomenal. Nutrition as a science has come of age. Now, however, we are entering a new era of awareness—an awareness that we never feed only food itself, that we also feed attitudes and emotions.

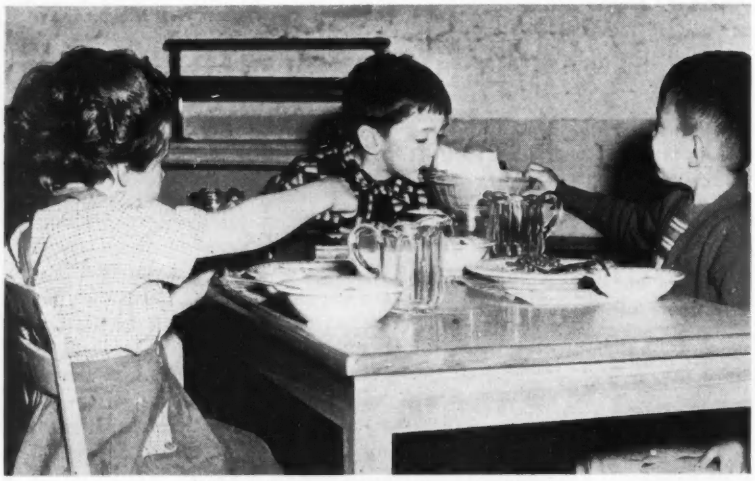
It is this whole new approach that would seem worthy of a large segment of our investigatory time—an interpretation of the science of nutrition in the light of current concepts of human development and behavior. We are no longer functioning in our own isolated avenues of investigation, but interchanging techniques, ideas, and insights with other disciplines to find out what people eat and why, what kinds of habits and attitudes people have about food, and how they develop. We must understand these phenomena if we are to achieve what each of us knows is the goal of modern nutrition education, namely, to put the selection of an optimal diet on the level of semi-automatic behavior rather than making food selection for each meal a conscious, personal choice.

We all know that we are driven to eat by the same internal mechanism as animals—hunger. Hunger begins in the newborn, causes pain, and is relieved by food. The reaction to procedures employed in the pain-food-relief sequence is the first step in the formation of food habits.

DEVELOPMENT OF FOOD HABITS

Feeding represents to the child his first learning about his world, the people in it, its rules, and his place in that world. Dr. Clara M. Davis (1) offers in her experiment three steps in the development of a selective appetite or food habit. First, she found that there is an initial period of universal sampling, providing both sensory experience with each food and an opportunity, through repetition, for the association of taste and smell with the appearance

[1] Presented at the 36th Annual Meeting of The American Dietetic Association in Los Angeles, on August 27, 1953.



Children in the nursery school practice group self-service

of the food. The second step is a memory for the character of the experience, so that sampling becomes unnecessary. The third step is a passing over of likes and dislikes into active, aggressive desire for some foods and neglect and rejection of others.

A food habit results, then, from repetition of experience with specific foods and the establishment of a preference for those to which one is accustomed. Most of us agree that most food habits and attitudes are formed during infancy and the preschool years. If we are to influence food habits favorably, therefore, we must do so during this period. We do not delude ourselves by thinking, as we did twenty years ago, that we can produce a generation free of food dislikes. What we try to do is to utilize the knowledge that a pleasant experience with a food is likely to produce a favorable attitude toward that food. Every healthy child is hungry. The hunger that appears at regular intervals is relieved by eating, and it is the mental pattern we create around eating—the way we present food to the child—that will influence an active like or dislike of a particular food.

NURSERY SCHOOL MEALS

The eating procedure followed in a nursery school can, therefore, represent a significant influence on food habits in adulthood. The basic principle underlying feeding procedures in the nursery school of the Merrill-Palmer School is to introduce as wide a variety of foods as possible in a relaxed, casual atmosphere. The procedure is oriented around what seem to be the focal points of adult-child interaction in the feeding situation, both at home and at school. These are: (a) limited self-selection of diet; (b) self-help; (c) elimination of the moral values usually attributed to acceptance or rejection of certain foods; and (d) introduction of new foods.

At present we place the entire meal, including dessert, on the table in small, uncovered casserole dishes. Each child takes as little or as much of the food as he wishes, with no comment from the teacher as to his acceptance or rejection of the food. The child eats for as short or long a period as he wishes, the understanding being that, except for legitimate reasons such as toileting, once he has left the table he has finished his meal. There are no restrictions as to the child's manner or method of eating, and he is not required to taste any new and unfamiliar food. As with other foods on the menu, the child is allowed as many desserts as he wishes, the object being to avoid the concept that "food is good, but not good for you" or that it is "not good, but good for you." The adult controls the eating situation in that he controls the kind of food presented. The meal is essentially a high-protein, low-carbohydrate combination, and desserts, as is necessary when they are presented with the main course, are preparations of egg and milk or fruit. The physical characteristics of the food are altered slightly from those of adult food to provide for ease of manipulation by the child.

EVOLUTION OF NURSERY SCHOOL FEEDING PROCEDURES

These techniques reflect the evolution of a philosophy of child development and the integration of knowledge about nutritional needs with other disciplines. Because a wealth of scientific information concerning the growth and development of individual children has gone into feeding techniques and procedures for dealing with children at mealtime, tracing some of the experiences behind our current procedures will show how a food situation can be integrated with a whole program for the young child.

The process of limited self-selection results from a swinging of the pendulum from the early days of the nursery school, in 1922, when a more rigid pattern was followed. A teacher's comment, taken from the school records, may be cited as characteristic of procedures at that time. "He objected to all the food. Was the last to take up his plate today and had scarcely taken anything. Then when he was ready for dessert, he was hungry and wanted bread. Miss H. told him that he would have to eat his lunch when the other children did or he would get none after this."

By 1934, the nursery school director deplored the insistence placed on the amount of food the children ate. She affirmed that feeding problems were being created by coaxing or threatening children to eat. She stated, however, that children should be encouraged to taste new foods, but recommended that anxiety over whether all the food was eaten at each meal should be

avoided, since such urging caused many difficulties.

Then, in the 1940's, evidence had begun to accumulate that when modified forms of self-selection of food were followed in nursery schools, the children ate the meal in a more businesslike manner and consumed more food than under rigid feeding procedures. The earlier studies of Davis (2) concerning the effect on the diets of infants of removing pressure and allowing freedom of choice indicated also that over a period of time children select adequate diets from a large assortment of simple cooked and raw foods, uncombined and unseasoned.

In the late 1940's, the Infant Service of the Merrill-Palmer School advocated the self-regulation feeding plan for infants. As an extension of this self-regulation plan to the nursery school, it was agreed that children should decide how much food they would eat as well as what foods they would choose from those presented. Today, we know that no two children have the same food requirements and that a child's appetite, like an adult's, varies from day to day. We feel that our role is to provide food of good nutritional quality for the child's selection. We structure the situation by this method. The average adult has little conception of how much food a child requires and eats. The process of self-selection allows a child to select the amount and kinds of foods he wishes, but the adult still influences the situation in that he controls the variety of foods presented. Thus the child may indulge himself in occasional food jags, which such investigators as Gesell and Ilg (3) and Davis (2) find characteristic of the preschool period. Yet over a period of time, the child will get an optimal amount of food for optimal nutrition.

LEARNING NEW FOODS

Throughout the early development of feeding procedures in our nursery school, children were urged at least to taste the foods presented. In 1936 it was suggested that when new foods were introduced, a small portion, beginning with a teaspoonful, be presented to each child as part of a well-liked and familiar meal. Examples of the children's reactions are reported in the school records: "Upon hearing Miss S. tell Linda that we should all taste everything, Edward touched his beet with his tongue and said, 'Look! I took a lick!'" It became evident that we were defeating our own purpose. In 1950, we removed all requirements of tasting of food. Now we attempt, instead, to stimulate the child's natural curiosity about a food, not by subtle urging, but by acquainting the children with the new food before it is prepared and introducing it with familiar and well-liked foods when they are served.

TEACHING TABLE MANNERS

Adults, we have found, too often expect children to conform to adult standards, not recognizing that the child's developmental level makes this extremely difficult. Particularly is this true with respect to table manners. In 1922, there was a great emphasis on proper table manners in the nursery school, in utter disregard of the level of neuromuscular maturation of the individual child. This comment from the records shows the attitude at this time: "Billy S. was sitting up very straight, not touching any of his food and being very polite. Aaron was making loud noises. Miss H. said, 'See how nice Billy is doing. See how straight he is trying to sit. He is not playing with his silver and he is being polite.' "

Recognition of differential rates of neuromuscular maturation led to a more flexible attitude. We now make no restrictions on children as to the manner or method of eating. That the use of the fork or spoon is no longer stressed is shown by the following example: "She was dropping apple slices in her milk and then eating them." Children of this age are learning to associate colors, textures, and flavors, and the feeling of food with the hands is a child's method of learning. We recognize that the best way to teach a child table manners is by example. We do not expect the child to conform to adult standards of proper behavior during meal times until he reaches adolescence.

THE PROBLEM OF DESSERTS

As an example of divorcing food from reward attributes, the service of dessert in our nursery school is unique, and purposefully so. The dessert is placed on the table at the same time as the rest of the meal. The child then takes as much dessert as he wishes before, during, or after the main course. Margaret Mead (4) describes dessert as a superego problem—that is, if you eat enough of the food that is not good but good for you, you are then permitted to eat a little of the food that is good but not good for you! By classifying foods as "right" and "wrong," Dr. Mead says, we are making food selection a moral issue. The prize or reward value attached to the "wrong" foods makes them even more desirable, and every meal becomes an experience in which an individual must decide whether he will do "right" or enjoy himself.

In our own nursery school, interest in dessert became acute in the early 1940's. Children arrived at the table demanding, "What's for dessert? What's for dessert?" They complied with the request that they "taste the other foods, at least," but then they had three to five desserts. One child, when a teacher remarked that if he ate his dessert first he would have no appetite for the main course, replied, "But if I eat my meat and vegetables, I'll spoil my appetite for dessert!"

At this time it was decided the dessert should be placed on the table with the rest of the meal rather than be withheld as a reward for a clean plate. It continued to have a special function in relation to other foods, however, because the number allowed was limited to two. Last year we began to ask ourselves why we limited desserts, since they can be as nutritious as any other part of the meal. Therefore, we removed all restrictions on the number of desserts, but we keep them

always a preparation of egg and milk or fruit. Thus we have tried to reduce the emphasis usually attached to dessert and to aid the child in accepting it more casually.

MAKING FOOD ATTRACTIVE TO YOUNG CHILDREN

Throughout the years of formulating our procedures and principles of feeding young children, the Merrill-Palmer School has constantly been aware of the physical conditions of eating and ways of aiding children to manipulate food. What to serve and how to serve it have been subjects of constant search.

Sweeny and Breckenridge (5) state in *How to Feed Children in Nursery Schools:* "Our experience in nursery school leads us to believe that color in food pleases and interests the child. Children react favorably to a variety in texture and consistency of food and are aware of contrasts in taste and flavor."

We have found that children are very conscious of the "feel" of foods and we, therefore, give them opportunities to experiment with "finger foods"—pieces of raw food cut in sizes that are easily manipulated. Bread and butter are made into sandwiches and cut in quarters. Raw fruits and vegetables are served in strips rather than in a salad. Sometimes several are combined to allow selection. Children have shown us that they really prefer simple, unmixed foods. Have you ever watched a child busily separate peas and carrots into two nice, neat little mounds?

Methods of preparing food for young children differ from those used for adults. The differences allow for the physical conditions of eating, suit the food to the child's level of fine muscular motor control, and provide an enjoyable eating experience that will stimulate the child's natural curiosity about the foods he eats.

HELPING THE FAMILY WITH FOOD PROBLEMS

In all of our experience with children we have constantly borne in mind the individuality of each child in reacting to his environment. The nursery school, a child-centered experience, represents only a fraction of the child's total world. The larger share of his learning comes from interaction with his family, for the home environment exerts the greatest influence on a child's behavior. Parents, we feel, must understand and feel comfortable in the atmosphere of this kind of "permissive" food situation and then interpret and evaluate our techniques in terms of their own personal goals for their children.

By means of guided observations and interviews with parents we stress that these techniques represent neither the "limitless" setting represented by the child-centered family of ten years ago nor the rigid, authoritarian, parent-centered family of earlier years. Our techniques have evolved rather as a recognition of the child's problems in adjusting his functioning as an individual in relation to his family and to a peer-group setting, such as we find in the nursery school.

Nearly all children at one time or another present feeding problems. In a forthcoming filmstrip we are interpreting some of our experiences in feeding young children in the nursery school and showing how the procedures developed can be applied in the home. Some of the points we emphasize are these:

(a) Self-selection of food at the family dinner table can mean simply giving the child an opportunity to choose between two or three raw vegetables.

(b) Appetites can be encouraged if small portions are served.

(c) Interest in food and eating can be stimulated by allowing the child to assist in simple preparations and encouraging him to participate in menu planning.

(d) Self-service offers a chance to develop fine motor skills and is no problem if the child is given foods easy to serve.

(e) Foods should be simply prepared and unmixed.

(f) Desserts should be removed from the reward class and can be if they are made of egg and milk or fruit.

(g) "Finger foods" provide opportunity for the child to associate color and texture with the flavor of a food.

(h) The tools of eating and the food itself should be suited to the developmental level of the child.

We emphasize that these procedures do not require separate preparation of meals for young children. Modifications are made in the method of preparation, not in the kind of food. This year we gave both parents and students a practical example of this fact by planning menus for the nursery school meal not as a separate entity but as a modification of the luncheon served in the staff-student dining room. Salads served adults became "finger foods" in the nursery school. Bread and butter were served as small sandwiches. Pie, minus the crust, became pudding. These are actually simple modifications of family meals.

Family food preferences are reflected in the likes and dislikes of the children, but food jags and appetite lags are part of the normal maturational process. It is the total food intake over a period of weeks that counts. We stress a casual, relaxed attitude and a respect for the child's appetite and tastes, as well as the fact that the lack of them is the key to avoiding feeding problems and making mealtime a happy time.

OTHER APPLICATIONS

From all available evidence, a relaxed, nonpressured atmosphere results in the formation of healthy attitudes about eating and mealtime, and this concept should become the common denominator of any feeding program for young children. Certain general techniques employed in one situation may then be applied in other similar situations to achieve the common goal. For example, the hospital feeding experience of young children should not be fundamentally different from the nursery school feeding experience. Both can exert a significant influence on future food likes and

dislikes and so must be considered in terms of the child's past, present, and future experiences with food.

A total feeding program embracing these aspects considers, first, the orientation of the child to a new environment and aiding him in adjusting to new routines. This adjustment can best be accomplished through close cooperation between parents and staff. Parents are the connecting link for the child between home and strange surroundings. Parents can help provide continuity of care if they understand techniques and can interpret them in terms of their own goals and purposes. Interviews, guided observations, and actual participation in activities are integral parts of the parent-child orientation to nursery school. As a part of this program, a food history is recorded in a conference with the mother. The child's food attitudes, nutrition, feeding problems, and the food procedures followed in the home are discussed. This information is evaluated and then in a later interview is interpreted to the mother in the light of her own observations of eating procedures in the nursery school.

To help bridge the gap for the ill child between family and hospital care, more participation by parents in hospital routines could lead to a feeling of shared experiences and thus foster closer cooperation between the family and the hospital. The food history interview taken by the hospital dietitian could help parents feel that the child is receiving individualized attention, not institutionalized care.

The information supplied in such an interview provides a wealth of material to aid the dietitian in making the new feeding experience more familiar to the child. It can also prove useful in preparing any necessary therapeutic dietary regimen or nutrition re-education program and giving the necessary instruction concerning it.

We have found that the child's relationship with one adult, the nursery school teacher, in the nursery school routines and dinner

Self-help can be encouraged at home, just as at school

aids in promoting his emotional security in new surroundings. If in the hospital the nurse responsible for the child's physical care could be responsible for serving his meals, she would become familiar with his food likes and dislikes and his eating behavior, as the nursery school teacher does. Such an opportunity provides a basis for working through with each child the common objectives of the feeding program.

That the food and the tools of eating should be suited to the developmental level of the child in any feeding situation is understood, but other aspects of the "permissive" feeding program are also applicable to the hospital situation. Limited self-selection of food and provision of choices of food have a place in the hospital feeding regimen. These and other techniques of group feeding have been reported as successful by Isabel Jordan (6) and others (7, 8).

The total experiences of the child participating in any of the Merrill-Palmer School services are regarded as dynamic, and as such demand close cooperation between the professional specialists on the staff. This cooperation is accomplished through interdisciplinary planning. At regular weekly sessions, the sociologic, psychologic, and physiologic aspects of the development of an individual child are discussed. Each specialist contributes his own insight to the total view of the child and in turn receives an integrated behavioral and developmental picture. That such a plan is practicable for the hospital has been suggested by Wallace (9), who states: "It is desirable . . . that the child care be considered a total plan of which feeding is one very important part."

A comprehensive feeding program implies a knowledge of human development and behavior. An understanding of the child as an individual reacting to his total environment is necessary to see how nutritional knowledge can be integrated with other disciplines dealing with human behavior, and also to see what contribution these fields can make to ours. This idea we need to incorporate into our daily teaching, training,

and thinking if we are to aid others in the interpretation of information about nutritional needs. We have set for ourselves the large task of establishing a dietary pattern of optimal nutritional value for a whole population. What better way to reach our goal than first to influence future adults to like what they eat, and then to eat what they like?

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The Problem of Progress

The low level of nutrition in most areas of the world is one of the main concerns of our time. Sheer hunger is prevalent but there is also the hidden hunger of people who live on inadequate food.

It is not enough to increase the available food supply. What has been supplied must be considered food, and acceptable food, by the people.

In Africa, the British government supplied veterinary service to cattle-raising tribes, but this did not increase their food supply at all, and actually contributed to soil erosion and depletion. These people love their cattle and kill them only on ceremonial occasions. Since the ceremonial occasions did not increase in number, the saving of cattle through veterinary aid merely resulted in too many cattle on the land.

There are specific preferences and objections which affect nutrition and health as well as the introduction of any new food or way of preparation.

West Africans, for example, have an aversion to food in its raw state, as fit only for cattle. The older people think it undignified to eat oranges and discourage children from eating them as oranges will make them "soft."

Greeks like raw vegetables and fruits, but not all vegetables are considered edible when raw. Cucumbers can be eaten only raw, but zucchini squash must be cooked; green beans and peas can never be eaten raw; cabbage is good when raw, but cauliflower is inedible.

In some parts of Africa, meat is eaten raw and food is seasoned with mineral salts. Both these practices lead to the spread of intestinal diseases.

Puerto Ricans, living precariously on too little food, often will not eat even fruit which grows wild, as they consider fruit to be poisonous, or dangerous, or a cause of indigestion.

Among many, there is the feeling that fruit is "cold," a term used for something objectionable.

Dietary balance was upset when Spanish American school children in New Mexico were persuaded to eat white bread instead of cold corn *tortillas*, when their main source of calcium came from the lime water in which the corn of the *tortillas* had been soaked. We persuaded their mothers to substitute canned spinach for wild greens, and when there was no money to buy spinach, the children went without greens.

Agricultural experts warn of possible disruption of dietary balance with the increase of commercialization.

For example, in many parts of rural India, where large amounts of *ghee* butter are consumed, the farmer's family depends heavily on the accompanying buttermilk. If buttermaking is to become industrialized, nutritional planning should take into account the gap this will leave in the family diet.

One commonly practised method of improving nutrition is through supplementary feeding of children and of expectant and lactating mothers. This does not attempt to change or stop existing practices.

Such attempts have met with resistance in the past, as in an instance when a public health nurse in a Chinese district was rejected because she tried to persuade expectant mothers to eat vegetables instead of a diet of fried chicken. These women had been eating mainly vegetables all their lives, and had looked to this period when their special status would be acknowledged by this special diet.

—From: Cultural Patterns and Technical Change, published by UNESCO, as published in World Health Organization Newsletter 6: 3 (October), 1953.

Child Feeding in the United States in the Nineteenth Century[1]

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THE WORLD has never witnessed a rapidity of growth and a complete alteration of living habits such as that which has occurred in the establishment of the American nation from the first colonies until the present day. No doubt, the American of 1800 was justified in believing that his life was very different from that of the early settlers, but the changes of the past century and a half have been so much greater that it is difficult for us to visualize the United States of 1800. Yet we need to be aware of the general background of social conditions and of the degree of scientific knowledge of that time if we are to trace adequately the progress of child feeding through the nineteenth century.

Because there was no canning, no refrigeration, and no fast transportation to aid in the preservation and distribution of food, supplies were chiefly from local sources and very seasonal. Home production and consumption were so completely the general rule that street vendors of milk did not make their appearance in Philadelphia until 1825 (1). The safeguarding of public health by regulation of food sales and by sanitary practices was not of general concern until as late as the latter part of the nineteenth century.

Poor sanitary conditions, frequent epidemics, and a lack of knowledge of the proper food for infants and children were large factors in the dreadful mortality among children under five years of age. Though economic and social conditions favored early marriage and large families, in many cases the number of children reaching maturity were few compared with the total born to the parents. Of eleven children born to the eminent physician, Samuel Bard, only three survived. Four were carried off at one time with "scarlatina in its most virulent form" (2). There are no over-all census records or mortality tables for the United States[2] between 1800 and 1900, but isolated records indicate the state of affairs. The American editor of Hugh Smith's *Letters to Married Ladies* states that in the city and county of New York for the five years between 1822 and 1826, 8,409 out of 21,007 total deaths, were those of children under five (6). For most of the century, especially in large cities, the deaths of children under five were nearly one-half of the total (7–10). In fact, the highest death rate for children was reached in a period past mid-century. In Chicago in 1873, the deaths of children under five years accounted for 59.3 per cent of the total mortality (11)! The heartbreak behind these figures is underscored by the suitability of including a chapter on "Loss of Children" in Mrs. Sigourney's *Letters to Mothers* (12). The death rate in smaller population centers was always lower, for there was a direct relation between childhood mortality and the incidence of summer diarrhea, a complaint common in the big cities (13, 14).

As might be expected, infant mortality was decreasing near the end of the century. Holt (15), at a meeting of the American Medical Association in 1909, presented figures to show that in 1888, 24.4 per cent of babies under one year in New York City died, but by 1908, the percentage had been reduced to 15.1 per cent. The clear relation of infant mortality to feeding problems was revealed in the discussion following the presentation of his paper. At that time, 85 per cent of children's deaths occurred among artificially fed children, and it was estimated that 20 per cent of the infants were bottle fed. In a paper read before the Association in 1912 (16), the mortality of children under one was tabulated according to the type of food which the infant received. The percentage mortality for the ex-

[1] Second Lydia J. Roberts Award Essay, read in part at the 36th Annual Meeting of The American Dietetic Association in Los Angeles on August 27, 1953. This Award is made possible by a grant from Gerber Products Company, Fremont, Michigan, for the purpose of encouraging historical study of nutrition. Presentation of the Award was made at the Annual Banquet of the Association on August 28, 1953, by E. Neige Todhunter, Ph.D. (see JOURNAL, page 1024, October 1953.)

[2] Figures for the mortality of English children about the same period are found in Forsyth (3), Underwood (4), and Combe (5).

clusively breast-fed was 6.98 per cent; for the breast-fed supplemented with artificial food, 9.87 per cent; and for the artificially fed babies, 19.75 per cent. The latter percentage seems high to us today, but it represented great progress. In London in the early part of the nineteenth century, "hand" feeding was estimated to be fatal to at least seven out of eight children (3).

The mother of a sick child in 1800 had no pediatrician to consult. In fact, she was fortunate if she could find a qualified physician. The care of children had long been a branch of medicine neglected by physicians and left to the ministrations of nurses and grandmothers. Consequently, when the physician became interested in the proper care of children and their feeding in particular, he had to cope with harmful customs handed down from generation to generation and the mother's tendency to rely on the advice of the monthly nurse or the older women in the neighborhood. The study of obstetrics emerged slowly, first from the domination by midwives and then from an association with surgery. Likewise, for many years the study of children's diseases remained combined with that of women's diseases. William Dewees and Michael Underwood, obstetricians, produced outstanding works on the management and diseases of children. Pediatrics was not officially recognized as a separate field until 1860, when Abraham Jacobi was appointed to the first chair of pediatrics at New York Medical College.

EARLY AUTHORITIES OF THE CENTURY

What were the child feeding practices advocated by physicians at the beginning of the nineteenth century? For an answer we can turn to the considerable number of treatises on the subject published in America about this time.[3] Though none of the authors was American, nevertheless their influence was widespread, particularly since so many American physicians received their medical degrees from Edinburgh, London, or schools on the Continent. William Buchan's *Domestic Medicine* (17), first published in 1769, went through nineteen editions and its American editions had great influence in this country (25).

Hugh Smith's *Letters to Married Ladies* (6) was published in England in 1767 but first printed in Philadelphia in 1792 (24). Editions continued to be published many years after his death. Smith was probably best remembered for development of his "bubby pot," a nursing vessel shaped somewhat like a teapot. Indeed, the tin nursing cans called "mammeles" (mameles), one of which was used in Pennsylvania as late as 1868, are of a similar type (26, 27). Smith and Buchan were masters of the flowery literary style. A passage from Smith's *Letters* will illustrate (6):

> Oh! that I could prevail on my fair country-women, to become still more lovely in the sight of men: Believe it not, when it is insinuated that your bosoms are less charming, for having a dear little cherub at your breast. I speak from the feelings of a man, and of one too, who has an universal and generous love for the virtuous part of your sex. Trust me, there is no husband could withstand the fond solicitations of an endearing wife, would she be earnest in her desire of bringing up her own children. Rest assured, when he beholds the object of his soul cherishing and supporting in her arms the propitious reward of wedlock, and fondly traces his own lineaments in the darling boy, it recalls a thousand delicate sensations to a generous mind: perhaps he drops a sympathetic tear in recollecting the painful throes of the mother, which she cheerfully bore, to make him such an inestimable present. His love, tenderness and gratitude, being thus engaged—with what rapture, must he behold her, still carefully intent upon the preservation of his own image!

Subsequent writers were more matter of fact, and consequently the substance of their thoughts can be digested more quickly. *A Familiar View of the Domestic Education of Children* (1832) (19), by Christian Struve, a German, was popular in America and is quite readable, although his translator criticizes his style as "a hasty and inelegant production." His only lapse into flowery phrase is a description of breast milk as "that balsamic liquor."

The publication of *A Treatise on the Diseases of Children* by Michael Underwood (4) marked a milestone in pediatric literature. Still (22) calls him "the most advanced writer on diseases of children in the 18th century" and with the publication of his treatise, "the modern study of disease in childhood had begun." Ruhräh (23) says that "for over sixty-two years, Underwood's book was the accepted text in pediatrics." It supplanted *De Morbis acutis infantum* written by Walter Harris, whose theories on acidity as the underlying factor in infants' disease had been accepted for a hundred years. In this respect Underwood, himself, wrote: "Acidity when injurious, is, probably, oftentimes rather an effect, than the first cause of the disorders of infants. It seems, indeed to be natural to them, arising alike from the weakness of their organs of digestion, and the nature of their food..." Underwood's style resembles a modern pediatric text more than do any of the previous treatises or essays, and the similarity is carried further in that he touched on the diet to be followed when the child is ill. He approved highly of Hugh Smith's advice and recommended his nursing pot, though he would appear to differ with him markedly on the "strength" of the food offered to the older child.

[3] Treatises by Hugh Smith (6), William Buchan (17, 18), Michael Underwood (4), Christian Struve (19), Richard Reece (20), and William Moss (21) have been chosen as most influential and as representative of this period. The reader is referred to Still (22) and Ruhräh (23, 24) for discussions of other pediatric writers of this time.

FEEDING THE NEWBORN INFANT

All of these writers were agreed that mother's milk was the best food for the infant; in fact, as the quotation from Smith illustrates, they exhorted women to nurse their own children. Dire consequences of ill health were predicted for the mother who did not nurse her baby. But in case a wet nurse was necessary, the proper choice of one was detailed. The dangers to the infant of disease and neglect at the hands of a bad wet nurse were well realized. Smith preferred raising a child under his own management, i.e., hand fed, to obtaining a wet nurse. The nurse of poor morals or one who "dealt much in medicine" was suspect, and properly so.

Panada or pap, made of bread, water, and brown sugar, and occasionally a little milk, was almost universally given to infants before the mother's milk flowed. This custom of giving solid food, whether it was pap or sirups and oil, was criticized severely, and little or no food was advised until the infant was put to the breast shortly after delivery. The laxative value of colostrum was recognized, but nevertheless, Underwood and Struve advised the customary use of some "lenient" purging material.

Smith is very specific in respect to feeding intervals to be observed and the amount of food for hand-fed infants. His suggested schedule was very like today's popular 4-hr. schedule. Struve suggested that the child be fed as often as it was truly hungry over the first two months, but that regularity should be observed after this age. Feeding intervals of 3 to 4 hr. during the day and one feeding in the night were recommended. Reece (20) was an exception in suggesting feeding only three or four times in 24 hr.

The addition of other food to the diet of the breast-fed child was begun very early. Underwood, Moss, and Struve allowed the addition of bread as early as the end of the first month; Buchan and Reece would wait until the third or fourth month; and Smith would not add pap until much later. Still (22) felt that Smith should have the credit for being the first writer in England to teach the sufficiency of breast milk alone for the feeding of infants up to the age of six or seven months.

The addition of animal food was still another moot question. Moss (21) gave chicken or veal tea on occasion to the newborn infant but agreed with Smith that the addition of minced meat should be postponed until the age of two or longer if possible. The general practice seemed to be that animal food in minced form must wait until the appearance of at least four teeth.

The appearance of the teeth likewise governed the time of weaning, although Underwood observed that the health of the baby should be considered and that some feeble infants benefit from weaning. Struve felt that there was a danger of the infant transferring its affections if it were nursed by a wet nurse past six months. Smith and Reece recommended the infant be nursed for twelve months.

It was generally agreed that food after weaning and in early childhood should be simple and free from too much seasoning. Fat meats, strong liquors, and sweetmeats were to be avoided. Moss was very much against the use of sugar. Vegetables were somewhat suspect—they might tend to worms; on the other hand, wine in moderation would help to counteract this tendency. Good ripe fruit was acceptable—Struve's translator would have the peel and stones eaten, too, to promote digestion! Underwood seems, today, more sensible than any other in his diet list for the young child. The monotony of cereals, broths, and liquids was broken by his freer use of meat, eggs, puddings, and such lesser used cereals as semolina, tapioca, and rice.

MILK FOR HAND FEEDING

If the child was to be hand reared, then cow's milk was generally recommended, although not without a discussion of the qualities of other milks. Ass's milk was deemed the most desirable of all the milks from the lower animals, especially for delicate infants. Throughout the nineteenth century it remained at the top of the list, even though it was almost never obtainable in America. There was one note of dissent—that of the American editor of Hugh Smith's *Letters*, who says in a footnote that the stories of the efficacy of ass's milk are not well attested. Underwood supported his discussion of the merits of the respective milks by two tables of analysis from the *Histoire et Mémoires de la Société Royale de Médicine* of France (1790). Moreover, he recommended the addition of sugar and of thin gruel or barley water as a diluent for milk—or, for the older infant, a gelatin mixture could be used in the same way. Others had recommended simple sugar and water dilutions, but apart from von Rosenstein (28), Underwood took the first definite step toward the evolution of a formula.

A strong barrier to successful hand feeding was the lack of understanding of the food values of substitutes for breast milk. It has been stated that there was a prejudice against the use of cow's milk for infant food during the eighteenth century, both in England and America (1, 29). This conclusion does not seem to be warranted. It is true that certain writers on the Continent discussed the advisability of omitting all milk and using a pap of bread boiled in beer or wine and diluted with sugar and water, but few agreed with this (22, 28).

Many of the old superstitions in respect to the transmission of animal characteristics through the milk had belonged to an earlier time (30), and although character transmission through a wet nurse was still credible, English physicians in the eighteenth century regarded animal milk as an essential food of the hand-reared infant.

The term "water pap" may be misleading in that, at feeding time, milk was mixed with the pap or bread boiled in water. When pap was used as a food in addition to breast feedings, it was permissible to dilute it with water, but if the child was hand reared, milk was to be mixed with it (22). It is probably true that much of the pap fed to hand-reared or weaned children was of a very weak nature. The following quotation from Smith's discussion of the proper quantity of milk for a newborn child would support this assumption:

> What think you, my dear ladies, of a Winchester pint[4] being a sufficient quantity for the day and night! Me thinks I hear an exclamation—O barbarous man! Under a pretence of correcting us, he intends to starve the little helpless creatures. Was there ever such a cruelty heard of before? Allow a child only a pint of milk in a day! Why, it would eat two quarts of pap, and still cry for more—Yet, after all surprise, an infant in the month will receive, from one pint of milk, more real and good nourishment, than from ten quarts of pap, as it is called. . .

The real difficulty was that where milk was not available, where it was in obviously foul condition, or where it did not agree, water, beer, or weak meat broths were cheerfully substituted and the eventual poor condition of the infant was blamed on some other cause like teething. Want of knowledge of the elements in milk necessary for growth was responsible for recommendations of beer or an infusion of one-third licorice-root and two-thirds couch-grass root as excellent beverages for children over the age of one year. At least the beer soup used by Struve when milk did not agree had the virtue of added egg yolks.

Similar ignorance is shown at a later date in the use as the sole infant food over a period of many months of dilutions of condensed milk or of commercial patent foods containing no milk. Naturally, the infant could not long thrive on a diet in which the protein, fat, and minerals, not to mention the vitamins, were so deficient. Practically from the beginning of the century, physicians advocated the use in artificial feeding of a food as nearly like mother's milk as possible. But, without knowing wherein substitute foods were like breast milk or how they differed, recommendations had to be based on trial and error. True knowledge in this respect had to await the development of the science of nutrition.

BOOKS ON CHILD CARE

The first American book on the feeding and management of children, *The Maternal Physician* written in 1810 by an American matron (31), was addressed to other mothers with the underlying thesis of "A mother is her child's best physician." The author quotes extensively from Buchan, Underwood, and Smith, although she was not always in complete agreement. She felt that milk (diluted with nearly half water and rendered palatable with sugar) was the only proper substitute for the breast and that "pap and other crudities" should be avoided. Her experiences with her own eight children give some insight into the general customs.

In 1825, George Logan published *Practical Observations on Diseases of Children* (32), the first book of considerable size by an American medical man on the diseases of children (33). Logan's feeding directions have a distinctly American application for he advised against weaning during April and May when cholera and bowel complaints were most prevalent, and he suggested foods, such as corn gruel, "homony," and parched corn water, which were solely American. He made the practical suggestion of using a teapot with a perforated soft cloth tied over the spout, as a nursing bottle. His book is noteworthy, too, because he gave some directions for diet during illnesses such as intermittent fever, scarlet fever, measles, and smallpox.

A Treatise on the Physical and Medical Treatment of Children, written by William P. Dewees (34) in 1825, occupied a respected position, overshadowing for many years the books of Logan (32) and Eberle (35) on the same subject. In many respects, his views were much like those of the early writers of this century. He was strongly in favor of maternal nursing; a wet nurse was to be preferred to the sucking bottle only when the child was very young and feeble, was ill and wasted, where the mother had a "tainted constitution," or where the bottle had been fairly tried and was not successful. The use of bread or flour pap was still quite common (36, 37), but Dewees felt that the only reason for giving a child other nourishment in addition to mother's milk was an insufficient quantity or a poor quality of breast milk. If supplementary food was needed, then it could be the same mixture of two-thirds cow's milk, one-third water, and a small quantity of loaf sugar which he recommended for a child fed by artificial means alone. At five months, barley water, gum arabic water, rice water, or a small portion of arrow root might be added. Animal food could be added after the grinding teeth appeared, although he felt that the healthiest children were those who ate the least animal food.

Whereas ripe fruit had been recommended rather freely in the past, it was beginning to be looked upon with suspicion because of its supposed association with the dread cholera. Dewees says, "We have witnessed this season [August 1825] three instances of dangerous cholera, brought on by means of these fruits [dewberry and blackberry]; and one which had nearly proved fatal, from the use of the syrup of the blackberry." He believed fresh or dried fruit for children under two years to be "uniformly

[4] 16 oz., U. S. measure.

mischievous." But by 1847, ripe, mellow fruit was once more regarded as suitable (38, 39).

John Eberle published in 1833 *A Treatise on the Diseases and Physical Education of Children* (35). Adams (40) calls this work neither new nor unique as it seemed to be based upon Dewees' earlier publication. However, Eberle did describe better than anyone else the custom of feeding newborn infants solid food and the unfortunate train of events which usually followed:

> No sooner is the infant washed and dressed, than the nurse is ready with her spoon and cup of gruel, pulverized crackers dissolved in water, or some such preparation, to fill its stomach to the utmost of its capacity; and this process of stuffing is continued with a ruinous degree of diligence and perseverance. The tender and uninured digestive organs of the new-born babe are thus often seriously injured during the first twenty-four hours. . . To relieve the colic, griping, flatulency, diarrhœa, &c. which ensue, recourse is had to catmint tea, anniseed tea, Godfrey's cordial, paragoric, or some other palliative or nostrum, and thus an additional source of gastric derangement or indigestion is brought into operation. The screams and restlessness of the infant occasioned by the griping and colic, are frequently regarded as manifestations of hunger. To appease this supposed craving, the stomach is almost constantly kept in a state of distention with food; and thus the helpless babe has no chance of escaping from the torments and ruinous consequences of its unfortunate condition.

European writers on child feeding continued to publish editions in America. *A Treatise on the Physiological and Moral Management of Infancy* by Andrew Combe (5) was warmly recommended by the Sanitary Commission of Massachusetts of 1850 and was quoted extensively by Catharine Beecher. Combe is enlightening on the reasons for stuffing the newborn child with solid food. "The vulgar notion that a child requires to be fed immediately on coming into the world rests on the absurd idea of its having undergone a long fast. . ." The important thing, then, was the administration of nourishment (little thought was devoted to digestion), and solid food was given because it was believed to contain more nourishment than liquids.

USE OF CREAM

The use of cream in infants' food began many years before. The first book on obstetrics written by an American, Samuel Bard (36), suggested that a very thin "Indian gruel, with the addition of a little new milk, or what is better, as it does not coagulate, a little fresh cream" be given to the infant when the mother was unable to nurse her child. Cream was used because Bard thought cow's milk "forms a hard, indigestible coagulum, to which cream is not liable." Dewees mentioned that Dr. Clark (London) recommended a farinaceous decoction mixed with a little cream if cow's milk disagreed. Miss Beecher in 1846 spoke of the mistake of many who gave diluted cream instead of milk, supposing it to be better for infants (41).

Cumming (42) in 1858 suggested the use of top milk (the upper third after standing 4 to 5 hr.), or the latter half milked from the cow in order to obtain a milk richer in fat. Then water and sugar might be added to approximate human milk and the strength of the mixture increased as the child grew older. It is interesting that Cumming used the term "modifying" and proposed that the latter half of cow's milk be used for city infants, that it be diluted and sweetened for each child separately, bottled, labeled, addressed, and distributed daily. Certainly this is the forerunner of an idea brought to fruit years later by T. M. Rotch (43)!

THE LAST HALF OF THE CENTURY

Infant feeding practices were in a confused state about this time. There was considerable debate over the use of farinaceous materials with milk for the artificially fed infant, a debate intensified by the growing manufacture and use of patent foods (44, 45). J. Forsyth Meigs (46) had suggested in 1848 a mixture of gelatin, arrowroot, milk, cream, and sugar, but Rotch (47) fixed the date of the first step in the scientific feeding of infants as 1854 when Dr. Frankland modified whey mixtures with cream. Biedert, in 1869, likewise used cream and whey mixtures to avoid the unfavorable effects of indigestible casein of cow's milk (45, 48). Then, in 1882, Arthur V. Meigs (49) published his analysis of breast milk which was accepted at first, from among the many diverse previous analyses, as the basis for milk modification (50).

The basic principle underlying the modification of milk was that since cow's milk is much richer in casein than human milk, it should be diluted to lower the percentage of casein, but in so doing the amount of sugar and fat is reduced below the level found in breast milk. Therefore, besides a water or cereal diluent, cream and sugar were added. The use of these modifications depended on a knowledge of the analysis of milks and on an assumption of the percentage of fat in the cream and milk which were used to make the formula. In the home modification of milk, the fat percentage varied with the temperature and time the cream was allowed to rise, and, of course, with the richness of the milk according to the breed of cow and the purity of the milk (51, 52).

THE FIRST MILK LABORATORY

Thomas Rotch felt that the methods of assumption of fat percentages in cream and milk were not accurate enough, and moreover he believed that feeding difficulties could be caused by the wrong amounts of any of the constituents of milk. Thus he

welcomed the opportunity to cooperate with George H. Walker and G. E. Gordon in establishing in 1891 in Boston the first milk laboratory.

Milk produced under the best sanitary conditions was used by the laboratory, and accurate percentages of cream or skim milk were obtained by the use of centrifuge milk separators. The laboratory could fill formula prescriptions with raw milk or milk sterilized to any temperature or time, diluted with water, limewater, or cereal gruel, and containing within wide limits any percentage of sugar, fat, and proteins desired. The bottles of prepared formula were delivered to the infant daily (43, 53, 54). In the first year the milk laboratory in Boston was patronized by more than 150 physicians and completely fed 1200 infants (55). By 1907 the number of laboratories had increased to a total of twenty in the United States, Canada, and London. Rotch envisaged their growth to the extent that they would fill the same position in the community as the prescription druggist (56). Their service, however, was expensive and remained confined to the larger cities.

The formulas of the percentage system of feeding, or the "American method" as it was sometimes called, were mathematically complicated and confused many mothers and physicians alike. Rotch, however, felt that the innumerable ways to alter the constituents of the formula were of great advantage. In *Pediatrics*, published in 1896, he says (57): "I have come to the conclusion that even slight changes in the percentages of the three important elements of milk of which we have most accurate knowledge—namely, the fat, the sugar, and the proteids—are of real value in the management of the digestion and nutrition of the infant, and that these changes are often necessary day by day as well as month by month." To many busy physicians such close supervision was impossible, but Rotch did accomplish a more general realization on the part of the medical profession that each infant should be studied as an individual and that feeding difficulties could be due to individual idiosyncrasies (58).

CONTROVERSY ON MILK MODIFICATION

There was one amazing man, Abraham Jacobi, who practiced in America from 1853 until a few weeks before his death in 1919. He is rightly regarded as one of the founders of American pediatrics, yet in respect to infant feeding he occupied the unique position of never subscribing to the theories of milk modification and percentage feeding that were so popular in the latter part of the nineteenth century. His simple feeding methods were probably regarded in turn as out-dated by the proponents of the percentage method and then as very up-to-date when the pendulum had swung the other way in the early 1900's. He carefully explained the physiologic reasons for his practices (33) which, in brief, were: Infants should be breast fed whenever possible. Physicians should insist on mothers nursing their children for at least the first two months, as the component parts of cow's milk are not identical with human milk in quantity or quality. The artificially fed infant should have boiled, sterilized, or pasteurized cow's milk diluted with cereal water, gelatin water, or gum arabic (generally barley water), and with cane sugar and salt added. The food of a young infant should not contain more than ½ per cent casein, that of a six-month-old baby no more than 1 per cent casein. Goat's milk is not acceptable because it contains too much fat and casein. Beef tea or beef soup could be mixed with barley or farina or gruel for babies of five months and older. At ten to twelve months, the baby could begin solid food with egg, bread crusts, or raw beefsteak. From his experience, Jacobi believed that many digestive difficulties of bottle-fed babies were due to too much fat. "The advice to add cow's milk fat to cow's milk in order to make it more nutritious or to make its casein more digestible, is dangerous."

Actually, percentage feeding was a method of calculation rather than a method of feeding (59). However, the regimen of infants raised on modified milk followed a characteristic pattern. According to Morse (60), Rotch was strongly influenced by Biedert's conception (48) of the indigestibility of cow casein and by A. V. Meigs' incorrect statement (49) that human milk never contained more than 1 per cent casein. The percentages of protein in the formulas were very low for the newborn. Holt, in his text on *The Diseases of Infancy and Childhood* (54), suggested beginning with 0.33 to 0.50 per cent proteids and increasing the amount to 1 per cent by the end of the first month. Rotch suggested an initial 0.75 per cent of proteids, 1.5 per cent at six weeks, 2.5 per cent at eight months, and 3.5 per cent at ten and one-half months. Generally, babies were not expected to gain for the first few weeks (61). Holt says, "It is seldom that the total quantity of proteids present in cow's milk can be given before a child is a year old".

FEEDING ROUTINES

Feedings were at frequent intervals, every 2 to 3 hr., and even at one year the child was fed a total of five feedings of 7 to 9 oz., at 3-hr. intervals during the day. Smith (62) said that at the age of six months the infant could probably take and digest 3 oz. without discomfort and in the last half of the first year even 4 oz. Small, frequent feedings were based on incorrect conceptions of the infants' stomach capacity.

Farinaceous food was added in the latter part of the first year, orange juice at ten months, and beef juice or meat broths about weaning time at one year. During the second year, eggs, a small amount of

animal food, stewed fruit as prune pulp or baked apple, ripe peaches, and baked potato could be added. It was considered better to omit the easily digested vegetables until the third year.

STERILIZATION AND PASTEURIZATION

The complicated formulas processed by the milk laboratories at the end of the nineteenth century were only possible because of a great advance in science and technology which provided a greater knowledge of the constituents of milk, a cleaner production of milk itself, the development of sterilizing and pasteurizing methods and equipment, and the development of a satisfactory nursing bottle from which the child could be fed.

A very great advantage of breast milk for babies was its cleanliness. In the past, many of the digestive difficulties attributed to cow's milk were probably due to the poor condition of the milk and gave rise to the intriguing advice, repeated over many years, that the infant should feed directly from the animal. The need for healthy cows, healthy milk handlers, and keeping the milk clean was not realized before the germ theory of disease was proposed. As the population became more urbanized and thus farther from the source of supply, slow transportation and no refrigeration increased the danger of contaminated milk. Even worse were the indescribably filthy conditions under which cows were stabled and fed on distiller's mash within city limits. In 1842, half of the milk used in New York City was from this source (63), and it was not until 1875 that its sale was finally outlawed (1).

Hugh Smith, Struve, and Underwood had suggested boiled milk for the very young infant in summer, or if there was any purging. Later, Jacobi recommended boiled milk, but the great majority feared that boiling altered the milk in some unknown way, a belief supported by the more frequent appearance of scurvy in infants fed on it. Others—notably Rotch, Coit, and Koplik—approached the problem differently by striving to improve the quality of milk. The Walker-Gordon farms, upon which the success of the first milk laboratory depended, served as an example for other dairy farms. Coit (64) originated the plan of certified milk in 1889 which was put into operation in Essex County, New Jersey, in 1893. At the same time, steps had been taken in the development of milk sterilization and pasteurization, and laws were enacted to prevent the rather wholesale adulteration of milk.

In 1889, Koplik (65) established the first milk depots where individual bottles of sterilized milk were given to infants suffering from digestive disorders. He thought (66) that "future labors must lie in the furnishing of dairies with apparatus for sterilizing milk on the spot. . ." Of pasteurization, he said, ". . . this scheme is scarcely practicable. What I mean by this is, that no means are as yet at our disposal to place this in every household." But shortly afterward, Freeman developed a much used home pasteurizer, and the Nathan Straus Milk Charity in New York City, over a period of five years, distributed two million bottles of milk or milk formula pasteurized on a large scale (67). Straus hoped to reduce the infant mortality among the poor and to demonstrate that pure milk could be obtained and sold at low prices (68).

CANNED MILK AND BABY FOODS

Milk in other than fresh form also entered into the infant feeding picture. In 1856 Borden was granted a patent for condensing milk, and soon plain condensed milk and condensed preserved milk (sugar added) were on the market (69). The latter was much used in infant feeding; it was inexpensive, could be kept almost indefinitely, was convenient, and was free from the hazards of contamination and lack of refrigeration. A real danger lay in that by diluting it to obtain a reasonable amount of sugar in the formula (4 per cent), the proteids were reduced to 0.6 per cent and the fat to 0.5 per cent, not to mention the ash constituents to which, at that time, little attention was paid. Physicians tried to remedy its deficiencies by adding cream (for the well-to-do) or cod-liver oil (through dispensaries for the poor), meat broths instead of water as a diluent, and orange juice as an anti-scorbutic (56, 70).

Patented baby foods developed after 1840 (71) were very popular. They were of three general groups: milk foods, such as Nestlé's; malted foods, such as Liebig's; and farinaceous foods, such as Robinson's patent barley (54, 62, 72). They varied widely in their approximation to breast milk when made up as directed (73), and if they were mixed with water, they did indeed warrant Rotch's appellation of barriers to scientific infant feeding.

FEEDING UTENSILS AND TOOLS

Successful artificial feeding depended on the development of a satisfactory nursing bottle. The popularity of "thick victuals" could, in part, be attributed to their being more easily handled, the care of pap boat and pap spoon presenting no problem. For thinner mixtures, sucking bottles of various materials, such as silver, pewter, and later, glass, were used at the beginning of the century. The primitive horn fitted with a buckskin nipple was used as late as 1846 in California (74).

The difficulty with all sucking bottles was in finding a suitable nipple. Dewees recommended a sponge in a specially prepared cow's teat attached by a string to the bottle. Eberle preferred as the sucking device the popular, hard-tipped silver tube covered with fine soft linen. Cumming suggested in 1858 a quill about which a cloth was tied. A nipple made of decalcified ivory in the present familiar

shape was patented in 1844. A big step was taken a year later when the India rubber nipple appeared, but at first these had an unattractive flavor and were difficult to clean, and some types were even suspected of being poisonous (75). In 1864, a patent was obtained for a nipple placed at the end of a long flexible sucking tube. This was a feature of every succeeding patent until 1886 (76). It was probably this apparatus which prompted Keating to suggest the cup and spoon for feeding infants: "I am convinced that in institutions for foundlings, if it could be possible to discard the bottle, the percentage of death would be very much diminished" (77).

When the importance of strict cleanliness of all feeding equipment was widely realized, the tube feeding bottle was universally condemned. The large breast-shaped nipple which facilitated proper care of baby bottles was introduced in 1894.

THE OLDER CHILD

In any discussion of child feeding, the older child who shared the table of the adult should not be forgotten. A prime source of information on life in the early part of the nineteenth century is obtained from travelers' tales, and all agreed that the food was poor, not so much from an original lack of quality as from poor preparation. A few years later, Miss Beecher's equally critical remarks (78) in support of her plea for education in domestic economy were not received with the same hostility as had greeted the descriptions of life in America by Mrs. Trollope and others. On the farms and frontier, salt pork and meal were staples; in the cities, markets provided a good selection of seasonal vegetables and fruits, but these played a minor role to the multiplicity of meat dishes considered essential in elaborate bills of fare. Cook books reveal how little salads were used until the latter part of the century (41, 79).

Confectionery was considered particularly harmful to children and young people. Reformers classed the liking for sweetmeats as a vice which would probably lead to the use of tobacco, drink, and other things more horrible (80). Even before Sylvester Graham (81) and his followers advocated vegetarianism, there seemed to be a fear of giving too much animal food to children. Dewees said, "Children should never make animal substances a principal part of their food, until after the age of puberty." Miss Beecher in 1845 (82) listed meat once a day, fine bread, rice, Indian puddings, vegetables, fruit, and milk as the diet of the children in the Orphan Asylum at Albany. Subsequently, meat was omitted. The use of meat by children was frowned on because it was regarded as a stimulating food; perhaps another reason was that in practice, children shared the table of their parents and so received an abundance of indigestible, highly seasoned meat dishes (7, 83).

Toward the end of the century, more attention was being paid to the diet of older children and school children (55, 72, 84, 85). Even though the list of foods permissible for young children was much extended over that of one hundred years before, liver, bacon, pork, raw celery, tomatoes, beets, bananas, and all canned, dried, and preserved fruits were among the foods forbidden to children under four years (54).

LAY LITERATURE

It is interesting to speculate on how well the recommendations of the medical profession in respect to child feeding were disseminated. Physicians had no opportunity to offer postnatal advice for the babies delivered by midwives, a figure placed at 50 per cent in 1912 (16). Many of the earlier books on child care and later, pamphlets issued by city and state boards of health were addressed to mothers. Newspapers helped to publicize this source of information.

There were many periodicals directed to ladies, of which Godey's *Lady's Book* was by far the most widely read and the most influential. The main features were fiction, poetry, moral essays, articles on the mental and moral development of children, fashion, needlecraft, and many "receipts"; only occasionally was there any mention of matters pertaining to the physical care of children (86, 87).

Most of the old cook books included sections on invalid cookery with recipes for the sick and for the infant. In one published in 1819 (88), a recipe for "artificial ass's milk" raises the interesting conjecture of whether this substitute was not sometimes used in place of the highly desirable but practically unobtainable natural ass's milk. The recipe follows:

> Boil together a quart of water, a quart of new milk, an ounce of white sugar-candy, half an ounce of eringo-root, and half an ounce of conserve of roses, till half be wasted.
>
> This is astringent; therefore proportion the doses to the effect, and the quantity to what will be used while sweet.

Two other versions are given, one of which adds egg, and the other hartshorn-shavings, pearl barley, and "snails that have been bruised," to the ingredients previously mentioned.

SUMMARY

In summary, it might be said that during the course of the nineteenth century, there were great changes in child feeding practices, especially those of infants. At the beginning of the century physicians, recently aware of the dangers of wet nursing, were becoming interested in proper substitutes for breast milk while at the same time, social conditions progressively diminished the availability of wet nurses. As late as 1885, wet nurses could be obtained

through agencies and advertisements, but the supply could not meet the demand (14). By 1897, Holt (89) dismissed the subject by saying that in the great majority of cases they are not required, but that sometimes they are indispensable. At the end of the century, pediatricians were agreed that wholesome, clean cow's milk, modified to suit the individual infant, was the proper substitute for human milk. The problems which were to occupy their immediate attention included the use of starch and cereal diluents; the chemical reactions of milk with limewater; the effect of boiling, sterilizing, and pasteurizing on the digestibility of casein; and the calculation of the caloric needs of infants. Indeed, it was a fascinating subject, so much so that a reviewer of current pediatric literature says, "In improving the method of bottle feeding, are we not in danger of neglecting the subject of normal lactation?" (90) –prophetic words for the twentieth century.

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The principles and values of a balanced diet must find a place in the education and practices of all citizens, or the public will continue to pay the penalty in proportion to the degree of prevailing ignorance and indifference.—*Dr. Charles Glen King, Scientific Director, The Nutrition Foundation, Inc., New York City.*

Children with and without Rheumatic Fever

I. Nutrient Intake, Physique, and Growth[1]

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RHEUMATIC fever is a condition found frequently in children throughout Utah. In fact, in a study of fifth grade students, Young and Viko (1) found a high incidence of rheumatic fever in Utah in relation to other parts of the United States. Coburn and Moore (2), in studying the relation of nutrition to susceptibility to rheumatic attacks, observed that the usual diets of children who were highly susceptible to rheumatic fever were low in protein, vitamin A, calcium, and iron. Jackson and Kelly (3) reported significantly lower rates of recurrence of rheumatic fever in children whose diets and level of environmental care had been improved in comparison with another group of rheumatic subjects not receiving this treatment. The nutrients found to be deficient in their study were protein, vitamin D, thiamine, and minerals.

To determine the relation between diet and physical well-being of children with and without a history of rheumatic fever, a nutritional status study was made in the Ogden, Utah area in 1950. In this paper, the findings on dietary intakes in terms of nutrients and the relation of dietary intake to physique and growth will be presented. Information on food patterns and servings, on findings from the blood analyses and medical examinations, and on the interrelationships between food intake and these findings will be presented later. Results from the dental examinations have been reported previously (4).

EXPERIMENTAL PROCEDURE

The 131 children, ranging in age from five to nineteen years, who comprised the rheumatic fever group were from the Ogden Rheumatic Fever Clinic and were paired as to age, sex, and economic status with children who did not have a history of rheumatic fever (control group) from the same area. Of the rheumatic fever group only four children had suffered active attacks within the previous six months; all others had histories of disease activity prior to that time.

Seven-day dietary records were obtained for each subject during the interval between July and November 1950. A nutritionist visited each home and gave the mother and child instructions for keeping the records and determining quantities of food eaten. None of the subjects was on a special diet at the time the records were made. The individual nutrients for each food item were calculated[3] using values from the Bureau of Human Nutrition and Home Economics (5). Supplemental cards for combination dishes were also used (6).

Height and weight measurements of the children were taken when they came to the clinic for their physical examinations immediately following the week in which the dietary records were kept.

RESULTS AND DISCUSSION

Dietaries

In Table 1 are presented the average daily intakes of nutrients by sex and age groups. The average intake of the ten- to twelve-year-old girls for many of the nutrients was slightly higher than the intake of the older girls. These differences in intakes were greater for the girls in the rheumatic fever group

[1] This study was a part of the Western Regional Research Project on the Nutritional Status of Population Groups in a Selected Area of Utah under the direction of the Utah Agricultural Experiment Station. It was financed in part from funds appropriated under the Research and Marketing Act of 1946. The cooperation and assistance of the Bureau of Human Nutrition and Home Economics and the Utah Department of Health are acknowledged. Received for publication August 10, 1953.

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[3] With IBM cards.

TABLE 1

Average daily intake of ten nutrients†

AGE	NUMBER	ENERGY	PROTEIN	FAT	CALCIUM	IRON	VITAMIN A	THIAMINE	RIBOFLAVIN	NIACIN	ASCORBIC ACID
					Rheumatic Fever Group						
years		*calories*	*gm.*	*gm.*	*mg.*	*mg.*	*I.U.*	*mg.*	*mg.*	*mg.*	*mg.*
Boys											
5–9	21	2167± 94	74.1± 3.44	91.0± 5.2	1182± 62	11.2±0.59	7602± 765	1.22±0.06*	2.20±0.09	11.5±0.62	63.4± 4.4
10–12	14	2255±119	79.6± 4.07	92.7± 7.8	1243±124	11.6±0.50	9258±1519	1.24±0.09	2.37±0.21	12.2±1.07	72.5±11.0
13–15	21	3031±191	101.5± 6.73	119.4± 8.4	1465± 92	15.3±1.10	7425± 752	1.59±0.11	2.71±0.16	18.1±1.64	78.8± 7.4
16–19	6	3073±279	103.1±11.10	122.4±12.6	1407±202	16.3±1.71	6742± 752	1.79±0.36	2.71±0.39	15.7±1.18	84.5±17.8
Girls											
5–9	18	1774± 86	63.2±3.14	74.7± 4.3	974± 57	8.6±0.49	5204± 411	0.95±0.06	1.78±0.09	9.3±0.50	58.3± 5.6
10–12	16	2198± 70	73.0±3.37	92.7± 3.9	1116± 78	11.0±0.56	6195± 775	1.08±0.05	2.07±0.13	12.0±0.64	65.7± 8.4
13–15	23	1909±102	62.6±4.14	76.6± 5.3	923± 86	9.7±0.71	5673± 558	0.98±0.07	1.69±0.14	10.6±0.62	64.1± 7.7
16–18	12	1832±139	67.0±5.53	74.5± 5.4	960±121	11.5±2.03	7618±1615	1.12±0.11	1.88±0.21	11.2±1.03	63.5± 6.6
					Non-Rheumatic Group						
Boys											
5–9	21	2177± 97	72.2±2.49	88.0± 4.9	1138± 49	10.6±0.68	7828±1441	1.05±0.05	2.14±0.12	11.1±0.56	63.5± 5.8
10–12	14	2518±125	86.9±3.49	107.1± 5.7	1298± 87	12.1±0.55	7886±1279	1.32±0.08	2.33±0.11	13.7±0.51	73.3± 7.9
13–15	21	2858±151	101.3±6.22	123.1± 7.5	1325±105	14.9±1.03	11921±4611	1.45±0.10	2.89±0.36	17.7±1.76	67.1± 9.7
16–19	6	3494±180	117.0±4.78	134.9± 5.6	1806±143	15.9±0.93	5800± 480	1.91±0.23	3.17±0.21	19.1±1.59	56.1± 8.4
Girls											
5–9	18	1979±110	67.9±4.13	83.0± 6.1	1005± 66	9.9±0.66	6616± 934	1.04±0.09	1.90±0.14	11.0±1.03	56.7± 6.3
10–12	16	2415±106*	79.8±3.87	105.3± 5.7	1116± 64	13.8±1.46	7130±1274	1.24±0.09	2.15±0.15	14.3±1.29	54.2± 5.6
13–15	25	2251±127	75.8±4.50	85.0± 5.8	1083± 82	10.9±0.66	5779± 668	1.14±0.08	1.99±0.13	11.8±0.69	57.1± 4.8
16–18	10	2176±184	75.2±6.08	90.0± 9.2	1060±124	10.9±0.66	6098± 889	1.14±0.09	1.97±0.19	11.6±1.07	41.3± 3.8

† Figures indicate mean intake and standard error.

* Differences between paired groups are significant at the $P < 0.05$ level.

than for those in the control group. The older boys in both groups, on the other hand, had higher intakes than the ten- to twelve-year-old boys.

A comparison was made of the values for the rheumatic fever and non-rheumatic groups by sex and age. The statistical analyses were based on paired values for the two groups. The ten- to twelve-year-old girls in the non-rheumatic group were consuming significantly more calories and fat than those in the rheumatic fever group, and the boys under ten years of age in the rheumatic fever group received more thiamine than the controls. Differences between values for other age groups were not significant. However, when the paired totals were compared, the non-rheumatic girls were consuming significantly more calories, protein, fat, iron, thiamine, and niacin than the girls in the rheumatic fever group.

When the average values of the intakes of nutrients were compared with the Recommended Dietary Allowances of the National Research Council (7), the children under ten were found to meet or furnish 90 per cent of the allowances. The older children were not in as good a position for every nutrient. The thirteen- to fifteen-year-old girls were in the poorest position in this respect. Average values for the rheumatic girls in this age bracket ranged from 65 to 80 per cent of the allowances for calories, protein, calcium, iron, thiamine, and ascorbic acid. The control girls of this age were somewhat better.

Although the average consumption of nutrients of the children in the various age groups would indicate that the children of both groups were comparatively well fed, many individuals had low intakes. Of all the nutrients, ascorbic acid was the one found most frequently deficient in the diets of all boys and girls (Table 2). Actually, more of the thirteen- to nineteen-year-old boys and girls in the non-rheumatic group were consuming less than 50 mg. ascorbic acid daily than in the rheumatic fever group (40 to 70 per cent vs. 10 to 39 per cent). Calcium and iron ranked next in frequency of deficiency for many of the older girls. Fifty-two per cent of the thirteen- to fifteen-year-old rheumatic girls were using diets containing less than 800 mg. calcium and 10 mg. iron as compared to 24 and 48 per cent for the girls in the non-rheumatic group.

Other workers have found similar results. Young, Smudski, and Steele (8) and Young and Pilcher (9) found the children under ten to have better nutrient intakes than older children. Results of dietary studies by several workers (8, 10–12) have indicated that intakes of ascorbic acid and calcium are likely to be low in the diets of children. Storvick *et al.* (12) also found iron intake often to be low in the diets of older children.

When a child with rheumatic fever first went to the clinic for treatment, instruction was given both to him and to his parents as to what he should eat to have a good diet. The benefits of this instruction appear to be reflected in the diets of the younger children to a much greater extent than in the older children. Approximately 17 per cent of the children

TABLE 2

Distribution of daily intake of calcium, iron, and ascorbic acid by age groups

RANGE OF INTAKE	5–9 YEARS				10–12 YEARS				13–15 YEARS				16–19 YEARS			
	Rheumatic fever group		Control group		Rheumatic fever group		Control group		Rheumatic fever group		Control group		Rheumatic fever group		Control group	
	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
Calcium																
Under 500 mg.			1	1					1	2		3		3		1
500–599 mg.		2								2	2	1				
600–699 mg.	2						1	1		3		1				
700–799 mg.		1		3	3	1			1	5	1	1				1
800–899 mg.	1	3	1	2		3		2		2	1	3		2		
900–999 mg.	3	3	1	2	1	3		2	1	2	3	1	2	1		2
1000–1099 mg.	2	5	5	4	2	1	3	2	1			3				1
1100–1199 mg.	3	1	6	2	1	3	2	4		3	1	4		4		1
1200–1299 mg.	3	1	4	1	4	1	1	1	1			2	1	1		2
1300–1399 mg.	1	1	2	1		3	3	3	2	1	2		1		1	1
1400–1499 mg.	3	1		1	1		2		1		4	2				
1500–1599 mg.	2			1					4	1	2				1	
1600–1699 mg.	1		1					1	3	1		1				
1700 mg. and over					2	1	2		6	1	5	3	2	1	4	1
Iron																
Under 6 mg.		2								2		1				
6–7 mg.	3	5	4	4	1	1	1	1	2	5		4		2		2
8–9 mg.	5	5	5	8	2	4	1	5	1	5	4	7		6		1
10–11 mg.	5	4	9	2	5	5	5	2	1	8	1	4	1	1	1	5
12–13 mg.	4	2	1	2	4	4	5		4		4	5	1	1		1
14–15 mg.	3		1	1	2	2	1	3	3	2	5	2	1	1	1	1
16–17 mg.	1			1			1	1	5		2	2	1		4	
18–19 mg.								2	2	1	3					
20 mg. and over			1					2	3		2		2	1		
Ascorbic Acid																
Under 30 mg.	1	1	1	4	1	1		3	1	3	3	3		1	1	1
30–39 mg.	3	4	6	2	1	2	1	1	1	2	1	2		1	1	4
40–49 mg.	1	1	1	2	4	2	2	3		4	8	5	1		1	2
50–59 mg.	6	5	3	2		5	2	4	2	4	2	5		4		3
60–69 mg.	2	3	2	4	1	2	3		6	3	1	5	1	2	1	
70–79 mg.	3	1	2	1	2		3	3	5	2		2	2	1	2	
80–89 mg.	2	1	2		3			1			1		1	2		
90–99 mg.	2	1		1		1		1	2	3		1				
100–109 mg.	1		3	2		1	1					1		1		
110–119 mg.			1		1				2		2	1				
120 mg. and over		1			1	2	2		2	2	3		1			

said that they had been on special diets at some time prior to this study.

Height-Weight Status

Heights and weights of the children were compared with the Baldwin and Wood standards (13). Deviations from these standards are shown in Table 3. The percentage of children rated normal, that is, within ±5 per cent of the standard, ranged from 20 to 55 and 27 to 50 per cent for the children in the rheumatic fever and non-rheumatic groups, respectively. However, those without a history of rheumatic fever had a larger percentage in the normal weight range than did those in the rheumatic fever group (42 vs. 30 per cent). A larger percentage of children were underweight than overweight in both the younger and older children. More subjects in the rheumatic fever group were 10 per cent or more underweight than in the non-rheumatic group (30 vs. 23 per cent). Still other children were underweight by 5 to 9 per cent (23 and 17 per cent for the rheumatic fever and non-rheumatic groups, respectively).

The height and weight of many of the children were below average when compared to the standard of Stuart and Meredith (14). Figure 1 shows the distribution of children in each of the percentile groups according to this standard. Approximately as many boys in both non-rheumatic and rheumatic

TABLE 3

Percentage of children in each weight rating, according to age and sex

AGE	NUMBER OF CHILDREN	UNDERWEIGHT		NORMAL	OVERWEIGHT	
		10% and over	5–9%		5–9%	10% and over
Rheumatic Fever Group						
Boys		%	%	%	%	%
5–9 years	21	24	38	33	5	0
10–19 years	41	29	21	29	2	19
Girls						
5–9 years	18	28	17	55	0	0
10–18 years	51	34	20	20	16	10
Control Group						
Boys						
5–9 years	21	19	28	33	10	10
10–19 years	41	24	12	50	7	7
Girls						
5–9 years	18	39	22	27	6	6
10–18 years	51	18	15	43	4	20

fever groups were in the 10 and 25 percentile groups for height as well as for weight, while the girls had slightly more in these percentile groups for height than for weight. The percentage of children in these percentile groups ranged from 30 to 51.

Height and weight values were also compared with Wetzel's standards (15). A larger percentage of values for the children in the rheumatic fever group fell in the physique channels which represented borderline (B_2) or poor (B_3, B_4) physique and growth than did the values for the children in the non-rheumatic group or in Wetzel's standards (Table 4). For the non-rheumatic controls, the percentage of girls found in each channel was similar to the standards of Wetzel, but more of the boys fell in the B_2, B_3, and B_4 channels.

The developmental level of each child was compared with his actual age. The number of children with good physique and growth, that is, above the 67 per cent level or auxodrome and B_2 channel but not in the obese group, was slightly greater in the non-rheumatic group (60 and 52 per cent for boys and girls in the non-rheumatic group, respectively, and 39 and 46 per cent for those in the rheumatic fever group). The percentage of children who were retarded more than 0.5 of a year from the standard was larger in the rheumatic fever group than in the control group (35 vs. 26 per cent).

For many of the children of the rheumatic fever group, height and weight data for previous years were obtained from their records at the clinic and plotted on their grids. The response in growth of 22 to 54 per cent of the children to treatment after their initial visit was in advancement at more than the normal rate of one-half channel of physique in ten levels of advancement. The younger girls made

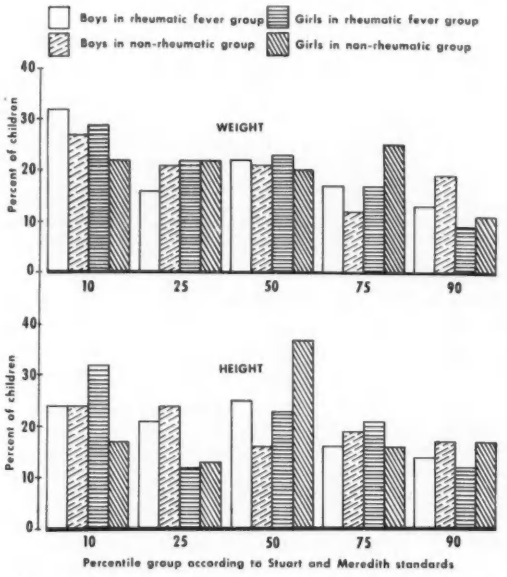

FIG. 1. *Percentage of children in each percentile group, according to the standards of Stuart and Meredith* (14).

TABLE 4

Percentage of children in each Wetzel physique channel

WETZEL GRID CHANNEL	PHYSICAL STATUS	RHEUMATIC FEVER GROUP		CONTROL GROUP		WETZEL STANDARD	
		Boys	Girls	Boys	Girls	Boys	Girls
		%	%	%	%	%	%
A_4	Obese	5.0	5.9	1.6	2.9	3.9	7.5
A_3, A_2	Stocky	5.0	4.4	4.9	11.6	9.5	11.1
A_1, M, B_1	Medium	45.0	52.9	64.5	56.5	70.6	55.8
B_2	Thin	30.0	25.0	16.1	16.0	11.3	15.7
B_3, B_4	Very thin	15.0	11.8	12.9	13.0	4.7	9.8

the best response. On the other hand, 15 to 36 per cent of the children showed a poor growth record, that is, their grids showed cross-channel curves bearing right or downward by one or more channels in ten levels of advancement.

The daily caloric need of each child was calculated on the grid. When these values were compared with the caloric intake calculated from the seven-day dietary records, the intake was 1 to 8 per cent higher for boys of both groups and 10 per cent higher for the five- to nine-year-old girls in the non-rheumatic group. The other girls had caloric intakes of 3 to 15 per cent below the grid values. The correlation coefficients of caloric intakes for both groups of boys were highly significant (+0.54 and +0.56 for boys in the rheumatic fever and non-rheumatic groups, respectively). Other correlations were not significant.

Dietary Intake and Physique and Growth

The children were divided into four groups: (a) those with good physique and growth, that is,

above the 67 per cent auxodrome and B_2 channel but not in the obese group; (b) those who were borderline, that is, either above the 67 per cent auxodrome or above the B_2 channel but not above both; (c) those with poor physique, that is, below the 67 per cent auxodrome and equal to or below the B_2 channel; and (d) the obese group. The dietary intake of the children in each group was then compared with the recommended allowances. A larger percentage of the boys with good or borderline growth met the daily allowances for all nutrients except for ascorbic acid than did those with poor growth (79 and 65 vs. 50 per cent for the rheumatic fever group and 73 and 72 vs. 46 for the non-rheumatic group). However, only 4 to 9 per cent of the boys with either good or poor growth were consuming less than two-thirds of the allowances.

The girls presented a different picture. The good, borderline, and poor growth groups either with or without a history of rheumatic fever had similar numbers who were ingesting at least two-thirds or were meeting the daily allowances except for ascorbic acid, iron, and calcium. Approximately 15 per cent of all the girls, with the exception of the borderline growth group of the rheumatic fever girls (36 per cent), were consuming less than two-thirds of the allowances.

Siblings

Siblings from twenty-one families, a total of fifty-one children, were included in this study. In fourteen of the families at least one child was in the rheumatic fever group and one in the non-rheumatic group. The other seven families had two children in the rheumatic fever group and none in the non-rheumatic group. The dietary intakes of children in the same family, when evaluated by comparison with the recommended allowances, tended to be similar. Of the first fourteen families, the children of nine families, whether in the non-rheumatic or rheumatic fever group, had intakes which were similar. Their dietary intakes met two-thirds or more of the allowances except for ascorbic acid. In three families, the child in the non-rheumatic group and in two families, the child in the rheumatic fever group had intakes which met the allowances except for ascorbic acid, while the other child had an intake below two-thirds of the allowances.

The siblings in five of the seven families with both children in the rheumatic fever group had similar ratings for their dietary intakes.

In seven families, one sibling had good physique and growth while the other child had poor growth. However, there were almost as many of these families which had children from the rheumatic fever group with good growth as from the non-rheumatic group. Growth was similar for the siblings from any one of the other fourteen families, but twice as many of the families had children with poor growth.

SUMMARY

Food consumption in terms of nutrients as calculated from seven-day dietary records is reported for 131 children with a history of rheumatic fever and for 131 children without such a history.

The girls in the non-rheumatic group were consuming significantly more calories, protein, fat, iron, thiamine, and niacin than those in the rheumatic fever group. Differences between the intakes of the two groups of boys were not significant. Differences between the intakes of the girls and boys of various age groups were not significant for most of the nutrients.

The children under ten years of age were consuming adequate diets when average values were compared with the Recommended Dietary Allowances. The older children had intakes of ascorbic acid below the allowances, and the older girls also had lower intakes of other nutrients except for vitamin A and riboflavin.

Low intakes of calcium, iron, and ascorbic acid were found in the diets of many of the older boys and girls. The thirteen- to fifteen-year-old girls of the rheumatic fever group were consuming less calcium and iron than other groups while the older boys and girls of the control group had the lowest intake of ascorbic acid.

Slightly more of the children in the rheumatic fever group tended to be underweight and were in the physique channels of the Wetzel grid which represented borderline or poor physique and growth than were found in the non-rheumatic group.

More of the boys with good physique and growth met the daily allowances for all nutrients except for ascorbic acid than did those with poor growth. Similar numbers of girls with either good or poor growth were meeting the daily recommended allowances or two-thirds of them.

Dietary intakes of children in the same family tended to be similar. Siblings from twenty-one families were studied, with seven families having only children in the rheumatic fever group. Growth was similar for the siblings of many of the families. However, more families with siblings had children with poor growth than good growth.

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Swedish Dietetic Association

Margaretha Neumüller, President of the Swedish Dietetic Association and Head Dietitian of the Karolinska Hospital, Stockholm (a state hospital and University hospital with 1580 beds), recently visited the A.D.A. office. Mrs. Neumüller is the first dietitian to receive a grant from WHO (World Health Organization) for travel study abroad.

During her time in the office, she explained some interesting aspects of dietetics in Sweden. She told us that the Swedish Dietetic Association (Svenska Economiföreståndarinnors Förening—S.E.F.) was founded in 1935 and now has 660 members. There had been an early dietetic organization, and training for dietitians was actually begun as early as 1918. The S.E.F. was founded to gather together dietitians in order to promote their interests and to carry on instructive, supporting, and advisory work in the field of public feeding.

The right of negotiations (see below for areas which negotiations may cover), has been granted to the S.E.F. Through these negotiations, the S.E.F. tries, along with the other thirty-six professional organizations such as those for nurses, lawyers, and doctors, to obtain the best economic and professional status for its members that is possible.

Members of the S.E.F. belong to one of four levels, which may be compared to the federal, state, local, and private levels in the United States. For example, Swedish dietitians may be engaged in what they call "state" institutions or in the Army. These institutions are similar to our federal institutions. Dietitians engaged in what they call "county" institutions work in institutions comparable to our state institutions. Then there are dietitians in the large community institutions which are roughly analogous to our city institutions, and there are also dietitians in private institutions and private businesses. It is, therefore, necessary to negotiate for members on all four of these levels.

Negotiations may pertain to two areas, the general regulations and the special regulations. The general regulations are those which are changed only infrequently and which apply to all of the professional associations in the country. They include: living accommodations, sick leave and salary, vacations, pensions, substitute salaries, resignation notices, and probationary periods.

Under the special regulations which vary with the profession, fall such topics as salaries, contract adjustments and contract cancellation periods, uniforms, and educational qualifications.

In the past, Mrs. Neumüller says, "We were reluctant to speak of salaries, for we thought it was unbecoming. Now, however, we realize that salaries are significant and are influential in attracting enough girls to study for the profession of dietetics, which is so important to our national wealth and economy. Therefore, we dietitians in Sweden consider ourselves fortunate that we have this means by which we can develop our profession and standards along the same pattern that the other professions of science, law, and medicine have done for many years.

"We try to explain to our members that they must expand their activities in community organizations as well as in their profession in order to gain a broad understanding of our country's needs."

Effect of Rate of Freezing on Pork Quality

Appearance, Palatability, and Vitamin Content[1]

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MANY conflicting statements have been published on the effect of rate of freezing on the quality of many frozen products. The following reports, which are limited to meat and fish, are of particular interest and illustrate the fact that differences of opinion on this subject are prevalent.

Taylor (1, 2) stated that physico-chemical changes occurring in the frozen condition were the basic explanation of the drip from thawed fish and meat, rather than the puncturing of cell walls by ice crystals or the rupturing of cells by expansion during freezing. He added, after speaking about corrective treatment and drip: "If these findings stand confirmed, the advantages of rapid freezing diminish somewhat in importance." However, he noted (about meat) that as the rate of freezing is decreased, the appearance of the resulting product undergoes a change: ". . . at very slow speeds there is a marked translucence."

Birdseye and Fitzgerald (3) have pointed out the importance of quick freezing of meat.

Tressler, Birdseye, and Murray (4) stated that quick freezing of meat and subsequent storage of the frozen product results in a marked tenderizing of beef, which continues during frozen storage.

Golovkin (5) found that in meat frozen by the accelerated process, formation of lactic acid during storage is less than in meat frozen by the standard process, rapid cooling retarding decomposition of glycogen.

Ramsbottom and Koonz (6) found more drip from slowly frozen small steaks than from similar steaks frozen rapidly. However, regardless of rate of freezing, the histologic appearance of the defrosted muscle tissue was similar to that of unfrozen muscle tissue.

DuBois, Tressler, and Fenton (7) concluded ". . . the more rapidly meat was frozen, the better was its all-around quality. However, the palatability of the roast which was frozen at the slowest rate was good; when cooked it was tender and juicy and of good flavor."

Hankins and Hiner (8) concluded that freezing steaks at −7°, −23°, and −40°C. (20°, −10°, and −40° F.) materially increased their tenderness over that of unfrozen steaks; also that −23° and −40°C. had significantly more tenderizing effect than −7°C. There was no real difference in effect between the two lowest temperatures. They were tested for tenderness by means of the Warner-Bratzler shear.

Smorodintsev (9, 10) found that meat proteins are not cleaved or denatured by freezing. He studied chemical changes taking place in the preservation and defrosting of frozen meat and concluded that the changes are caused by enzyme action. Glucose progressively decreases, while lactic acid accumulates. In stored quick-frozen meat, the changes occur more intensively than in slow-frozen meat.

Brady (11), while pointing out the importance of quick freezing of meat, stated, "It is of interest to note, however, that the palatability committee scores were not significantly different for either method of freezing . . ." (slow-frozen vs. quick-frozen).

Lee and co-workers (12) found that the rate of freezing had little effect on the flavor, odor, texture, juiciness, or appearance of beef after it had been cooked and served. These authors showed, also, that the content of thiamine, riboflavin, niacin, and pantothenic acid was not measurably altered by the rate of freezing of beef.

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The present study was undertaken to determine whether the rate of freezing would have any effect on the B-vitamin content of pork, as well as any noticeable effect on appearance, color, texture, and palatability of the several samples after cooking.

EXPERIMENTAL PROCEDURES

Preparation of Samples

The wholesale loin was removed from each of two pork carcasses immediately after the carcass cooled. The *longissimus dorsi* muscle was stripped out and cut into fourteen chops from each side. All chops from the right side of the carcass were numbered 1 to 14, from anterior to posterior. Corresponding chops from the left side were similarly numbered, except that the letter "A" was suffixed to each number.

All chops were wrapped in 300 MSAT 87 Cellophane, with the drugstore wrap, then given an additional wrap in ordinary butcher paper, and labeled.

Rates of Freezing

The chops were divided into three lots and frozen as follows:

By plate contact at −46°C. (−50°F.). Freezing time: 1½ hr.

In a home freezer at −17.8°C. (0°F.) in still air. Freezing time: 5½ hr.

In an insulated box in a home freezer at 0°F. in still air. Freezing time: 19 hr.

Freezing times were determined by the use of thermocouples placed in the center of test samples, with the time required to reach 0°F. ascertained.

The samples not used immediately were stored at 0°F. for six months.

Analytical Procedures

Immediately after freezing, samples of each lot with the "A" suffix were thawed and broiled to an internal temperature of 66°C. (150°F.). Also, an unfrozen control, which had been held in the refrigerator at 1.1°C. (34°F.) was cooked in the same fashion. These cooked experimental samples, the cooked control samples, and a raw, frozen sample from each series were analyzed for total solids, ether extract, thiamine, riboflavin, pantothenic acid, and pyridoxine. This was repeated after storage at 0°F. for six months, without, of course, the control.

Samples were prepared for analysis by first removing as much fat as possible. Procedure was to mix 100 gm. meat with 200 gm. distilled water, then thoroughly grind in a Waring Blendor. In some cases, samples smaller than 100 gm. were available, in which case twice the weight of water was added to the meat sample, and the mixture was blended. Samples of the resultant slurry were used for analyses.

A determination of total solids was made by drying in the vacuum oven at 70°C. (158°F.) for 48 hr., followed by cooling and weighing. The light aluminum dishes containing the dried solid material were crumpled, and placed in Soxhlet extractors. Anhydrous ethyl ether was used to extract them overnight. After this, the samples were removed from the extractors, ground to a powder, and returned for further extraction with anhydrous ethyl ether. After a total of 48 hr., flasks containing the extracted matter were removed, the excess ether distilled off, and the samples dried and weighed in the usual fashion. The grinding step in the middle of the extraction was found to give more satisfactory results. Solids are reported on the moisture-free, fat-free basis.

Thiamine was determined by the thiochrome method of Moyer and Tressler (13), and riboflavin by the chemical method of Scott *et al.* (14).

For determination of niacin, samples of the slurry obtained from mixing the meat in a Waring Blendor were acidified with 1 N sulphuric acid in the proportion of 150 ml. acid to 10 gm. slurry. After autoclaving at 15 lb. for 20 min., the mixture was filtered, an aliquot of the filtrate adjusted to *pH* 6.8, and diluted. Niacin was assayed using a culture of *Lactobacillus arabinosus* 17-5 according to the method of Snell and Wright (16), as modified by Krehl, Strong, and Elvehjem (17) and Barton-Wright (18) and further modified by reading the turbidity rather than by titration. The turbidimetric procedure gave sufficiently accurate results under the conditions used, for comparative purposes.

Samples of the slurry were prepared for determination of pantothenic acid by autoclaving in water, and for pyridoxine by autoclaving with 0.055 N sulphuric acid (15). Pantothenic acid was assayed using a culture of *L. arabinosus* 17-5, according to the method of Skeggs and Wright (19). Pyridoxine was assayed, using a culture of *Neurospora sitophila* 299, according to the method of Stokes *et al.* (20) as modified by Barton-Wright (21).

TABLE 1

*Effect of rate of freezing on the palatability of pork chops**

FACTOR	AVERAGE ACCEPTABILITY SCORE		
	0°F. frozen in insulated container	0°F. frozen in still air	−50°F. fast frozen by contact
Appearance			
Over-all	4.1	3.8	4.2
Color	4.2	4.0	4.4
Cut surface	4.4	4.2	4.1
Flavor of lean	4.2	4.0	4.2
Tenderness	3.9	4.0	4.4
Juiciness	3.9	3.6	4.5
Average	4.1	3.9	4.3

* Scores based on scale of 5 to 1, denoting excellent to unsatisfactory. Averages are for scores of eight judges.

RESULTS

Palatability. The results of the palatability tests (Table 1) show few differences in the several factors under consideration. Differences in the figures shown in this table are insufficient to be of any significance.

Vitamin Content. The figures on vitamin content of the several samples are brought together in Table 2, which contains the results, on the fat-free dry basis, obtained from unstored samples and from those stored for six months. Moisture-free, fat-free solids are given also.

Figures on pantothenic acid and pyridoxine of cooked samples are missing from the columns for the following freezing conditions: 0°F. insulated and 0°F. still air. This is because insufficient sample was available for this part of the work, and in the opinion of the authors, it was more desirable to have the results after storage. This course was followed, and the data are presented accordingly.

No differences of any importance are noticed among the results, except perhaps that for pantothenic acid in raw samples and for cooked samples frozen at −50°F. with no storage. Since this difference was not observed in the corresponding stored samples, it is probably of no significance.

Thiamine was found to be lower in the cooked samples. Based on information in the literature, the loss of this vitamin under these conditions is to be expected.

DISCUSSION

The results obtained in this study show that rate of freezing has no effect on the B-vitamin content of pork, cooked or raw. Very slow, moderate, and fast freezing was employed.

On the other hand, the authors do not wish to create the impression that excessively slow freezing will give meat of good quality. It is obvious that unreasonably long delays in the freezing of meat might lead to changes, brought about by microorganisms, which would be undesirable. Also, the rate of freezing should not be confused with over-all time of handling. This work deals only with the several rates of freezing described. It would be unwise to retard unnecessarily the freezing of research samples, or to load a home freezer with the unfrozen packages obtained from the entire carcass of a large animal. These units do not ordinarily have the capacity to take care of such a large load at one time and, therefore, such use could end in unsatisfactory results.

SUMMARY

Pork chops cut from the *longissimus dorsi* muscle were frozen at several speeds: (a) very rapidly to approximate commercial quick-freezing, (b) moderately slowly in still air, in a home freezer, and (c) very slowly in an insulated package. Samples taken from unfrozen meat, samples taken immediately after freezing and after six months' storage were analyzed raw and cooked for certain vitamins, were inspected physically, and were tasted.

The flavor, odor, color, texture, juiciness, or appearance of pork as it appears on the table was not affected by the rate of freezing prior to frozen storage of the raw meat.

The thiamine, riboflavin, niacin, pantothenic acid, and pyridoxine contents of the meat were not altered by rate of freezing.

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TABLE 2

*Vitamin B values and solids in pork after freezing, storage, and cooking**

FREEZING CONDITION	THIAMINE		RIBOFLAVIN		NIACIN		PANTOTHENIC ACID		PYRIDOXINE		SOLIDS	
	0 days storage	6 months storage	0 days storage	6 months storage	0 days storage	6 months storage	0 days storage	6 months storage	0 days storage	6 months storage	0 days storage	6 months storage
					Raw							
	mcg./gm.	*mcg./gm.*	*mcg./gm.*	*mcg./gm.*	*mcg./gm.*	*mcg./gm.*	*mcg./gm.*	*mcg./gm.*	*mcg./gm.*	*mcg./gm.*	*mcg./gm.*	*mcg./gm.*
Not frozen	27.6	—	5.7	—	126.4	—	13.2	—	23.5	—	24.21	—
0°F., insulated	25.2	26.4	4.7	4.6	125.5	135.3	13.4	10.3	20.1	15.0	23.90	23.95
0°F., still air	22.8	28.6	4.3	4.3	126.5	136.3	11.0	11.4	16.1	14.9	22.77	24.21
−50°F., contact	20.9	28.6	4.0	4.9	105.0	130.0	7.9	11.6	18.8	15.2	24.00	23.76
					Cooked							
Not frozen	24.4	—	5.4	—	123.7	—	11.7	—	16.0	—	28.14	—
0°F., insulated	20.1	22.2	5.1	4.2	130.8	111.5	—	16.7	—	14.4	28.45	31.22
0°F., still air	19.8	23.8	4.1	4.6	122.1	127.3	—	14.8	—	13.7	29.48	29.69
−50°F., contact	18.8	22.2	4.4	4.6	132.7	108.1	7.8	13.9	12.3	13.3	29.39	31.63

* Fat-free, dry basis.

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Ten Cents' Worth of Nutrients

In the January–February 1954 issue of *Nutrition Committee News* (released by Human Nutrition Research Branch, U.S.D.A.'s Research Service), a helpful table is attached which reports purchasing power of 10 cents in terms of nine nutrients in 60 different foods. Figures have been based on 1952 prices. The 60 foods are those priced regularly by the Bureau of Labor Statistics. Nutritive values are the maximum to be expected, for no adjustment has been made for losses in cooking and storing in the home.

From this table, visual aids to suit any level of nutrition education might be developed. Thus homemakers and other food shoppers might have a handy reference to help them develop the ability to make good food choices.

A similar table can be made using local prices. Nutritive returns can be figured from values in Table 2 of Agriculture Handbook No. 8 or a similar source, by the following formula:

$$\frac{\text{amount of nutrient per lb.}}{\text{price per lb. (in cents)}} \times 10 = \text{nutritive return for 10 cents}$$

The following examples taken from the table will indicate the usefulness of this approach:

FOOD	PRICE PER UNIT 1952	RETURN FOR 10 CENTS									
		Quantity	Food energy	Protein	Calcium	Iron	Vitamin A value	Thiamine	Riboflavin	Niacin	Ascorbic acid
	cents	*lb.*	*cal.*	*gm.*	*mg.*	*mg.*	*I.U.*	*mg.*	*mg.*	*mg.*	*mg.*
Peas, canned	20.9, #303 can	.48	147	7.4	55	3.9	1182	.24	.13	2.2	19
Peas, frozen	23.9, 12 oz.	.31	107	8.1	24	2.1	954	.47	.16	2.7	26
Oranges, #200	50.6, doz.	.99	146	2.9	107	1.3	614	.25	.09	0.8	160
Orange juice concentrate, frozen	18.6, 6 oz.	.24	162	3.0	37	1.1	360	.26	.06	0.8	154
Hamburger	63.3 lb.	.16	230	11.5	6	1.7	0	.05	.10	2.7	0
Ham, whole	65.2 lb.	.15	235	10.2	6	1.5	0	.42	.11	2.4	0
Milk, fresh delivered	24.2 qt.	.89	275	14.2	477	0.3	641	.14	.69	0.4	5
Cheese, Cheddar	60.7 lb.	.16	276	17.3	503	0.7	972	.01	.30	*	0
Ice cream	31.4 pt.	.20	188	3.6	112	0.1	472	.04	.17	0.1	1

* Less than .05 mg.

Effect of Added Softeners on Moisture Content of Bread[1]

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TO THE consumer as well as to the producer, the freshness of bread and the retention of that quality is a matter of great concern. Daily baking and delivery of bread are common in all communities. The search still continues for a substance which can be added to the bread formula which will produce a loaf that will remain fresh for a longer time. Since the consumer usually associates the quality of freshness with softness and moistness—objective qualities which lend themselves to physical determination—most of the work in this field has dealt with compounds which would have a softening effect.

Investigators have found that a compound such as polyoxyethylene stearate has a softening effect on the firmness of bread during storage (1–5). Edelmann and Cathcart (3) found it to be the most effective softener of a number of emulsifiers tested. Whether the softening effect is actually an anti-staling property has been disputed (6).

Most of the investigations have utilized only white breads, although a few have studied other types of breads or made comparisons between varieties. Bekkering and Hintzer (7), using a variety of flours of different extractions, found that polyoxyethylene stearate improved the volume and preserved the softness of the bread, the effect depending on the flour. The greater effect was with the higher extraction flour.

Although some success has been achieved with various chemical compounds, from the aesthetic viewpoint, the use of a natural product for retarding loss of moisture or softening bread would be desirable. It has been shown by Harris *et al.* (4) that potato flour improves bread flavor, aids in retention of freshness, and increases water absorption. From a personal communication (8), it was learned that a potato starch product, M-200, produced by the Idaho potato industry, had been tried in several commercial bakeries and found to improve the dough, to give good grain and texture, and in some cases, to increase softness. Best results were obtained with 2 to 3 per cent of M-200 added, with a corresponding weight of flour omitted.

The purpose of this study was to compare the moisture retention of white bread with that of bread made from a new whole wheat flour, Unifine[2]. The effect of adding polyoxyethylene stearate and M-200 to these two types of bread was observed.

METHODS

To utilize loaves of optimum volume for this study, different formulas were used for the white flour and for the obviously different whole wheat flour. This whole wheat flour is produced in a high speed rotary mill (2, 9), and its fineness is more comparable to patent flour than other whole wheat flours.

Finney and Barmore's formula (10) was used for the bread made from the white flour. This formula specifies the addition of malt and bromate. These substances have no appreciable effect on the whole wheat formula and were, therefore, omitted.

The formulas are shown in Table 1.

The standard fermentation procedure of the American Association of Cereal Chemists (11) was followed. The white loaves were baked for 25 min. at 400° F., and those made from the whole wheat flour for 30 min. at 350° F.

Loaf volumes were obtained by seed displacement.

Polyoxyethylene stearate[3] was added to the two formulas at a level of 0.5 per cent; M-200, a potato product, was added in three series as follows:

Series I: 1.5, 2.5, and 3.5 per cent added to white bread. Equal weights of flour were subtracted for each addition.

[1] Scientific Paper No. 1035, Washington Agricultural Experiment Stations, Institute of Agricultural Sciences, State College of Washington, Pullman, Project No. 850. Received for publication July 22, 1953.

[2] The name given to a whole wheat flour ground in an experimental mill (2, 9) from the entire wheat berry.

[3] R. T. Vanderbilt Company.

TABLE 1
Bread formulas

TYPE OF FLOUR	COMPOSITION OF BREAD								
	Flour	Sucrose	Skim milk powder	Salt	Crisco	Malt	Bromate	Compressed yeast	Water
	gm.	*gm.*	*gm.*	*gm.*	*gm.*	*gm.*	*gm.*	*gm.*	*ml.*
White (Damon Patent)*	100	6	5	1.5	3	0.25	0.004	3.25	70
Whole wheat (Dark Northern Spring†	100	10	8	2	2.5	—	—	3.25	80

* Formula based on 14 per cent moisture (14.4 per cent protein).
† Formula based on 14 per cent moisture (15.9 per cent protein).

Series II: 1.5, 2.5, and 3.5 per cent added to white bread, and equivalent weights of water added.

Series III: In two trials, 2.5 per cent of the M-200 was added to whole wheat bread. In one, no adjustments were made; in the other, the water was increased 2.5 per cent.

The bread was stored unwrapped at 30°C. in a chamber with a relative humidity of at least 85 per cent. Tests were run on loaves of bread when fresh and at the end of one and three days. Longer storage under these conditions resulted in mold development.

The "Precision Penetrometer," having a plunger with a diameter of 1.2 cm. and a weight of 110 gm., was employed to measure the penetration after 2 seconds. One-in. cubes of bread from the bottom of the loaf after the crust had been cut away were used. Three to six readings per loaf were taken.

The loaf of bread with crust removed was shredded in a Waring Blendor to obtain a uniform crumb size and homogeneous sample. Moisture determinations were made by the method of the Association of Official Agricultural Chemists (12).

The crumb swelling test of the American Association of Cereal Chemists (11) was modified. A 5-gm. sample was placed in each of four weighed 50-ml. centrifuge tubes; 30 ml. water were added; and the crumb was mixed well. Samples were allowed to stand at 30°C. for 30 min., then stirred again, and the tubes centrifuged. The supernatant liquid was poured off, and the sediment weighed. The calculation for crumb absorption was:

$$\text{crumb absorption} = \text{water absorption of crumb per gram} = \frac{\text{weight of sediment} - \text{weight sample}}{\text{weight of sample}}$$

DISCUSSION

From Table 2, it can be seen that polyoxyethylene stearate increased the loaf volume of the whole wheat but not the white bread. The effect of the M-200 seemed to be somewhat in the opposite direction; the loaves containing the higher amount in place of part of the white flour, or added to the whole wheat bread, decreased the loaf volume slightly. Other volumes were fairly consistent with the standards. The volumes of the whole wheat loaves were less than those for the white bread, although the uniformity and texture were excellent for each.

Compressibility

The smaller volume and more compact standard loaf of the whole wheat bread would account for the lower penetrometer readings of compressibility when compared with the fresh standard white bread. At the end of three days, however, the white bread became as firm as the whole wheat. This would seem to indicate a much greater change in the moisture retention in the white bread. When polyoxyethylene stearate was added, the softening effect on the whole wheat loaves was small if any, but on the white bread it produced considerable effect, as it was much softer than the whole wheat at the end of three days. In Series I, where M-200 was added and an equivalent amount of flour omitted in the white bread, the loaves became much firmer than the standard at the end of three days. With whole wheat bread (Series III), the 2.5 per cent addition without water acted similarly. With 2.5 and 3.5 per cent increase in amount of M-200 plus increased water (Series II), there was a slight softening effect on the white bread, but use of the 2.5 per cent M-200 plus water (Series III) caused the whole wheat bread to become as firm as the standard.

Moisture Retention

The moisture retention for the standard whole wheat bread was higher than for the standard white. This was expected because the whole wheat flour appears to have greater absorptive capacity. When polyoxyethylene stearate was added to both, the white retained more moisture than before, while the whole wheat retained less. The substitution of M-200 for part of the white flour or the whole wheat did not alter the moisture content at the end of three days. However, this compound with correspondingly increased amounts of water also increased the amount of moisture retention in both types of bread.

TABLE 2

Effect of polyoxyethylene stearate and M-200 on the volume, compressibility, moisture content, and crumb absorption in white and whole wheat bread

TREATMENT	LOAF VOLUME	COMPRESSIBILITY			MOISTURE CONTENT			CRUMB ABSORPTION		
		Fresh	1 day	3 days	Fresh	1 day	3 days	Fresh	1 day	3 days
White Bread										
	ml.	*mm.*	*mm.*	*mm.*	*%*	*%*	*%*	*gm.*	*gm.*	*gm.*
Standard	902	232	214	105	43.6	42.4	30.8	1.7	1.6	2.2
Plus POES*	906	220	171	139	43.5	40.6	36.8	1.4	1.5	1.8
Series I: M-200 added and flour subtracted										
1.5%	904	238	191	57	43.4	40.1	29.2	1.7	1.7	2.4
2.5%	893	226	182	40	43.7	41.7	30.7	1.9	1.8	2.3
3.5%	897	227	168	43	43.5	40.7	30.5	1.9	2.0	2.4
Series II: M-200 added and water added										
1.5%	898	220	210	104	44.2	44.2	38.8	1.9	1.8	2.2
2.5%	928	230	189	120	44.3	42.8	39.1	1.7	1.7	2.0
3.5%	899	230	194	120	44.7	44.0	37.9	1.7	1.7	2.2
Whole Wheat Bread										
Standard	672	149	140	100	45.3	43.7	38.1	1.8	1.8	2.2
Plus POES*	715	182	141	105	44.6	43.3	37.0	1.5	1.6	1.9
Series III: M-200 added										
2.5%	659	149	135	85	44.0	43.1	37.9	1.9	1.9	2.2
2.5%†	687	157	135	100	44.3	43.9	39.5	1.8	1.8	2.1

* Polyoxyethylene stearate.

† Water increased.

Crumb Absorption

The crumb absorption increased as the bread became older, and at the end of three days, 1 gm. crumb absorbed as much as 2.4 gm. (or 240 per cent of its weight) of water. On storage, the standard whole wheat and white breads absorbed water at about the same rate. Adding polyoxyethylene stearate decreased the water absorbed at the end of three days by both the whole wheat and white loaves by about the same amount.

SUMMARY

Breads were made from patent and whole wheat flours and stored for periods of three days in a cabinet maintained at 30°C. with a relative humidity of at least 85 per cent. Compressibility, moisture retention, and crumb absorption tests were done with samples when they were fresh, one day old, and three days old. The whole wheat bread lost moisture more slowly than the white bread. The addition of polyoxyethylene stearate had a definite retarding effect on the rate of loss of water in the white bread but only slight if any influence on the whole wheat. A natural potato product, M-200, had no measurable effect on either bread under the conditions of the study.

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Editorial

Evaluation Form for Staff Dietitians

Last month The American Dietetic Association published two new Evaluation Forms—one for rating performance of staff dietitians, the other for use in dietetic internships in rating interns' progress. These forms will meet a long-felt need for tools for objective appraisal—both of individuals, and, in the broader sense, of the success of the profession in meeting its ideals.

Almost everyone, on meeting another person, forms an opinion or impression of the other. Such informal appraisals are good enough for social contacts, but supervisors in a professional capacity have a responsibility that goes beyond this in rating those who work with them. The publication of the Evaluation Form makes available for the first time a system for impersonal ratings of staff dietitians so that performance can be graded by uniform criteria or standards.

The Evaluation Form was developed after more than a year of research by the psychologists of the Personnel Research Institute, Western Reserve University, Cleveland. Members of The American Dietetic Association provided all of the material and data from which the Form was evolved and statistically validated. Originally, the project involved only the development of a form for rating dietetic interns. As a by-product, so to speak, the much needed form for rating staff dietitians was adapted from the intern form.

The Evaluation Form for staff dietitians is divided into three parts. Part I—a single sheet—consists of a series of twenty "descriptive pairs" of phrases which dietitians themselves have used in describing other dietitians they know well. The rater must decide and indicate which of each of the pairs *more nearly* applies to the ratee, although it may not necessarily be *completely* true. For example, one pair of phrases reads:

> Would do well in a supervisory position
> Refuses deliveries that do not meet her high standards

One of each pair is, of course, more "favorable." Each pair was selected for its discrimination value as indicated by statistical analysis. The weighting, or "favorableness" of these items will remain confidential information. This method of *describing*, rather than *rating* an employee is a relatively new technique, but one which is now being rather widely adopted by industry. It seems to have the advantage of reducing biases of raters, since they are unable to judge the relative "favorableness" of various items.

Part I, when completed by the rater, is sent to the Personnel Research Institute for scoring. Within a week, the Institute reports the ratee's score in terms of percentile, or standing in relation to norms for dietitians in general.

Part II of the Evaluation Form consists of three "rating scales" which are concerned with the dietitian's ability as a supervisor, her relations with other professional people and patients, and her ability as a teacher. These scales have been constructed along the more familiar or conventional lines of degrees of perfection, ranging from bad to excellent, with a 15-point scale of differentials. Five degrees of achievement are defined. Within each of these categories, three shades of proficiency are indicated. The rater is expected to designate the shade of proficiency within one of the degrees of achievement.

Although it is not obligatory, raters are requested to send scores for Part II, the Rating Scales, to the Personnel Research Institute (as for Part I). It is hoped that as data are accumulated, norms for comparing raters' standards may be established. With such criteria, it would be possible to learn whether a person is a "hard" or "easy" rater, so that she could adjust these tendencies to conform more nearly to a uniform, nationwide standard.

Part III presents a method of assessing the relative merits of "candidates" for promotions. Six qualifications of importance for dietitians are compared in terms of requirements of the present position and those of the next higher post.

The immediate value of this system of evaluating performance of staff dietitians will be obvious to administrative and supervisory dietitians. Perhaps not so obvious, but nonetheless as important, are the benefits which will accrue to the entire profession. As data are accumulated, by a central clearing agency, of evaluation scores of persons in the field, administrative dietitians will be able to learn how their ratings and staffs compare with those in other situations throughout the entire nation. Then, as strengths and shortcomings are revealed, work can be channeled toward improvement to meet desirable standards in regard to: individual rating procedure, entire organizations, and the individual staff dietitians. Through rating conferences, staff members can be apprised of their good points and their weaknesses and encouraged to improve their performance in areas where their ratings have been below the standards which exist in other institutions.

Current Comment

Foods Eaten by College Students

Acceptability, Adequacy, and Cost[1]

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Three things are of special concern to the dietitian who strives to serve institutional groups successfully: the adequacy of the food served, the actual foods eaten by the patrons, and the cost. Obviously, provision of an adequate food intake at moderate cost counts for little unless patrons consume it. If breakfasts are missed and lunches or dinners omitted, division of the total amount served by the number in residence gives an erroneous picture. For such studies, data on the nutrient value of the food offered, the actual number of residents eating each meal, the number selecting each item, and the amount eaten are essential.

This study was undertaken to discover the degree of adequacy of the food served in the Women's Residence Halls at the University of Washington, Seattle. The menu was checked for: protein, thiamine, riboflavin, and ascorbic acid content; the food actually eaten by the residents; and the proportion of the total food budget spent for each food group.

PROCEDURE

The standard portion of each food served in the halls was weighed for one week and its protein, thiamine, riboflavin, and ascorbic acid value calculated, using the Leichsenring and Wilson short method (1). Care was taken to be sure the portions on which calculations were based were of standard size. To do this, a tray was taken from the regular serving line for each of the twenty meals.

To obtain figures on variability of individual food intake, records were made of the number of girls eating each meal, the number of refusals, the number eating each food, and the number selecting seconds of each item. The total count for each of the twenty meals (three for six days and two on Sunday) includes those trays saved for known late-comers and the number of sack lunches taken out by those who had schedules which conflicted with meal hours.

Analysis of the cost of serving such menus over the previous three years, including the proportion spent for each class of foods—meat, fish, poultry, and eggs; dairy products; fresh and frozen fruits and vegetables; and cereals and bread—was made from the residence halls accounts.

FINDINGS

It will be seen from Table 1 that there were days when the amount provided, had all items and meals been eaten, would have supplied somewhat less than the Recommended Dietary Allowances (2), but that the week's average for the four nutrients (protein, thiamine, riboflavin, and ascorbic acid) reached the allowances. The amounts served supplied a daily average of 78 gm. protein, 1.3 mg. thiamine, 2.1 mg. riboflavin, and 83.6 mg. ascorbic acid.

The fact that 60 per cent of the protein was from animal sources indicates that the essential amino acids were adequately provided.

Leichsenring and Wilson found (1) that a seven-day period is 98.9 per cent accurate when calculating the nutritive value of a diet. Therefore, since residence hall menus are based on a seven-day week, these calculations reflect accurately the food supplied for these college women.

Individual Intake

The variability of individual intake for the seven-day period is shown in Table 2, which indicates that 42 per cent of the girls missed breakfast, 19 per cent missed dinner, and 11 per cent were absent for lunch.

The ascorbic acid content of the menu fluctuated greatly, going from very low to extremely high levels. Those girls who missed breakfast, especially on the days when little ascorbic acid was supplied by the other two meals, obtained far less than the amount

TABLE 1

Average protein, thiamine, riboflavin, and ascorbic acid content of food served during the week

DAY	PROTEIN	THIAMINE	RIBOFLAVIN	ASCORBIC ACID
	gm.	*mg.*	*mg.*	*mg.*
Tuesday	88.8	1.2	2.1	35.3
Wednesday	88.3	1.7	2.3	86.8
Thursday	79.5	1.2	2.1	70.8
Friday	76.8	1.3	2.0	131.9
Saturday	85.4	1.3	2.1	44.9
Sunday	45.4	1.0	1.7	87.4
Monday	81.0	1.3	2.4	128.2
Average	77.9	1.3	2.1	83.6
Difference between average and Recommended Dietary Allowance	6.5%	0.1%	0.2%	4.5%

[1] Condensed from a thesis presented in partial fulfillment of the requirements for the degree of Master of Science, University of Washington. Received for publication April 8, 1953.

calculated. This also applied to the 16 per cent who refused breakfast fruits.

The percentages of those present who accepted the various menu items are shown in Table 3. Since only 36 per cent chose cereal, 84 per cent the breakfast entrée, and 59 per cent bread, it is evident that the actual nutritive intake was considerably lower than the amount calculated. Also, the 30 per cent who did not drink milk received less riboflavin than is indicated by the calculations. The fact that 25 per cent of the girls failed to eat salad at lunch or dinner also reduced actual intake below calculated figures.

The most popular items, as shown by the percentage of those selecting second portions, are listed in Table 4. It was noted that no seconds were taken for either cereal or potatoes, regardless of variety or preparation. Few second portions of vegetables were chosen.

Cost

The money allotted for food service in these residence halls (and the cost students pay) is $1.50 a day. Over a three-year period, raw food costs averaged 46.3 per cent of the income, or 70 cents per day per capita. For the first six months of 1952, raw food cost was 54.98 per cent of total income, or 83 cents per capita per day, which is considerably more than the three-year average. Johnston (3) indicated a range of 72 cents to $1.07 a day per resident for food in a low- and moderate-cost bracket based on April 1952 retail prices in Seattle.

Thus, the 76 per cent of the residents who were present at all meals and those who selected seconds received more than full return for their daily food dollar, while the 24 per cent who missed meals were not receiving full value.

The largest share (60 per cent) of the food dollar was spent to supply animal protein (Table 5). The expensive food group was also the most popular. The percentages of all food groups are presented in Table 6. Of the total food budget, 37.7 per cent went for fish, meat, poultry, and eggs; 21.5 per cent for dairy products; 12 per cent for fresh fruits and vegetables; 7 per cent for frozen fruits and vegetables; and 6 per cent for cereals and breads. Augustine's work (4) showed a 10 per cent expenditure for cereals while Tracy (5) reported 3.6 per cent spent for cereals and

TABLE 2

Per cent of women residents eating meals

MEAL	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY*	MONDAY	WEEK'S AVERAGE
Breakfast	69.0	75.9	67.2	66.4	28.4	30.2	69.8	58.1
Lunch	94.0	90.5	92.2	92.2	73.3	—	93.1	89.2
Dinner	95.7	86.2	82.8	78.4	70.7	60.0	90.5	80.6

* Only two meals served on Sunday.

TABLE 4

Per cent of those present selecting second portions

MENU ITEMS	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY	MONDAY	WEEK'S AVERAGE
Cereal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Breakfast fruit	1.3	29.5	5.1	33.8	6.1	42.9	1.2	17.1
Breakfast entrée	15.0	0.0	3.2	9.1	12.1	0.0	6.2	6.5
Luncheon entrée	0.0	5.4	1.7	1.1	2.6	†	0.0	1.8
Dinner entrée	0.5	0.0	0.0	0.0	0.0	†	0.0	0.1
Milk (at each meal)	16.9	12.1	15.3	13.9	11.3	2.9	14.0	12.3
Bread (at each meal)	25.4	20.9	18.4	10.7	8.8	8.6	17.1	15.7
Salad (luncheon and dinner)	6.1	9.5	8.6	7.8	9.2	†	6.8	8.0
Dessert (luncheon and dinner)	1.5	0.0	0.0	0.6	4.6	†	0.0	1.1
Vegetable (luncheon and dinner)	0.0	1.0	0.0	2.8	*	†	0.6	0.9
Potato (luncheon and dinner)	0.0	0.0	0.0	0.0	0.0	†	0.0	0.0

* No separate vegetable on the menu on this day.

† Only two meals served on Sunday. No way to check as Sunday dinner was served family style.

TABLE 3

Per cent of those present who accepted the different menu items

MENU ITEMS	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY	MONDAY	WEEK'S AVERAGE
Cereal	37.5	35.2	33.3	24.7	51.5	37.2	34.6	36.3
Breakfast fruit	56.2	94.3	85.9	92.2	84.8	100.0	74.1	83.9
Breakfast entrée	78.7	65.9	80.8	84.4	75.8	100.0	81.5	81.0
Luncheon entrée	98.9	95.2	98.9	100.0	100.0	†	95.4	98.1
Dinner entrée	100.0	98.0	100.0	97.8	96.3	†	100.0	98.7
Milk (at each meal)	74.9	72.1	68.3	68.2	73.4	60.0	73.7	70.1
Bread (at each meal)	73.6	88.6	59.3	39.7	49.9	†	44.4	59.2
Salad (luncheon and dinner)	68.6	73.9	83.6	72.1	82.2	†	71.6	75.3
Dessert (luncheon and dinner)	83.3	82.0	90.4	83.2	82.8	†	95.4	86.2
Vegetable (luncheon and dinner)	90.8	95.9	92.7	93.3	*	†	64.6	87.5
Potato (luncheon and dinner)	75.2	80.6	85.4	76.4	75.6	†	81.4	79.1

* No separate vegetable on the menu on this day.

† Only two meals served on Sunday. No way to check as Sunday dinner was served family style.

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Vitamin A	843 I.U.	1745 I.U.
Thiamine	.12 mg.	.7 mg.
Riboflavin	.45 mg.	1.6 mg.
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TABLE 5

Per cent of raw food cost spent for protein foods

TYPE OF PROTEIN	AVERAGE RAW FOOD COST			
	1949	1950	1951	3-year average
	%	%	%	%
Animal protein	58.22	60.04	59.29	59.18
Animal protein plus cereal	63.42	65.43	66.17	65.00

bread and 39.3 for meat, fish, and eggs. Bryan (6) in 1949 stated that 28 to 34 per cent of the food dollar should be spent for meat, poultry, and fish and 25 per cent for dairy products (excluding butter).

SUMMARY AND CONCLUSIONS

The nutritive value of the meals served in the Women's Residence Halls at the University of Washington, Seattle, for a seven-day period was calculated. If three meals were eaten, the average diet met the Recommended Dietary Allowances for protein, thiamine, riboflavin, and ascorbic acid.

The actual number present at meals, food refusals, and the "seconds" selected were noted. The absentees from breakfast averaged 42 per cent, from lunches 11 per cent, and from dinners 19 per cent.

Of those present at meals, 64 per cent rejected cereals, 41 per cent bread, 30 per cent milk, 19 per cent the breakfast entrée, 16 per cent breakfast fruit, 21 per cent potatoes, and 25 per cent salads. Thus, highly nutritious foods were often refused.

The cost of food for the first six months of 1952 was 83 cents per resident per day, with 38 per cent of the food budget going for meats, fish, poultry, and eggs; 22 per cent for dairy foods; 6 per cent for cereals and breads; and 19 per cent for fruits and vegetables.

TABLE 6

Proportion of food dollar spent for food groups, 1949 to 1951

FOOD GROUP	AVERAGE RAW FOOD COST			
	1949	1950	1951	3-year average
	%	%	%	%
Meat	28.74	31.46	29.36	29.85
Fish	1.81	2.21	2.04	2.02
Poultry and eggs	6.21	5.20	5.98	5.80
Milk and dairy products	21.46	21.17	21.91	21.51
Cereals and breads	5.20	5.30	6.88	5.82
Fresh fruits and vegetables	12.09	12.58	11.26	11.98
Frozen fruits and vegetables	7.97	6.91	6.43	7.10
Groceries (including canned products)	16.52	16.18	16.11	16.27

Despite the high-quality menus attractively served, the personal habits and preferences of a group determine the adequacy of the individual diet in terms of actual intake.

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Precooked and Fresh Frozen Beef Roasts

Total Weight Loss, Drip Loss, and Tenderness[1]

ELIZABETH LOUISE DAHLINGER and
MARTHA N. LEWIS

Department of Dietetics, Ohio State University Hospital, Columbus

Meat is a food that can be frozen and stored over a period of time. Most meat at present is frozen fresh, but people are beginning to freeze cooked products. A small variety of precooked frozen foods is available, and as these products become more acceptable to consumers, this phase of the frozen food industry will expand.

This study, the first of a series conducted at The Ohio State University, was done to determine if a significantly different weight loss by evaporation, weight loss in drippings, total weight loss, volume of drip loss, and a difference in tenderness could be determined between fresh frozen meat which is thawed and then cooked and meat precooked and frozen. Results indicated generalizations which, with further study, may prove interesting to food managers and homemakers.

PROCEDURE

Beef roasts were cut from the rounds of four experimental animals raised at the Ohio Agricultural Experiment Station in Wooster, Ohio. The rounds were divided into four boneless roasts; the knuckle by removing the conventional knuckle bone from the round; the inside by removing the aitch bone and securing the meat just below this bone; and the outside rump and heel by dividing the outside into two

[1] The data reported here are from the thesis of Elizabeth Dahlinger presented in partial fulfillment of the requirements for the degree of Master of Science, The Ohio State University. Received for publication January 25, 1954.

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roasts, one containing the rump muscles and the other containing the heel muscles.

The thirty-two paired roasts were prepared by two treatments. In Treatment 1, sixteen roasts or one of each pair were wrapped in laminated, vaporproof paper, frozen for a twenty-five-day period at −10°F., thawed for 30 hr. at 40°F. and 2 hr. at 70°F., cooked until the internal temperature was 160°F. in an oven of 300°F., and cooled for 1 hr. The other sixteen roasts were prepared in a similar manner except that the order was changed. They were roasted, cooled, wrapped, and then frozen (Treatment 2).

A comparison of weight losses and volume of drip loss was determined by weighing the roasts and drippings and measuring the drippings before and after roasting, and after cooling, freezing, and thawing.

Variations in tenderness as affected by the treatments were rated by the Warner-Bratzler mechanical shear test and a panel of eight judges. The mechanical shear consists of a shearing block between which a knife is drawn. Cylinders of meat 1 in. in diameter and ¾ in. in length were placed in an equilateral triangle opening in the blade and the amount of force necessary to shear the core of meat was recorded by the machine. The more tender the meat, the less resistance it offered the blade.

RESULTS

Results indicated that there was little difference in the weight loss by evaporation between the two treatments. Meat freshly frozen, thawed, and roasted lost 18.3 per cent, while 18.4 per cent was lost when the meat was roasted and then frozen. This difference was not significant.

Meat frozen fresh, thawed, and roasted produced a greater weight loss in the form of drippings (13.5 per cent) and loss in volume of drip (640 ml.) than meat precooked, frozen, and thawed which lost 11.3 per cent and 499.06 ml. respectively. These differences were significantly in favor of meat prepared by Treatment 2.

The greater drip loss resulting from Treatment 1 caused the total weight loss to be greater—31.8 per cent—while Treatment 2 resulted in a 29.7 per cent decrease. The difference was significant.

The amounts of tenderness given by the mechanical shear showed a highly significant difference between the two treatments. Meat frozen fresh, thawed, and cooked was rated superior.

The panel of judges disagreed with the mechanical tester; they preferred the precooked and frozen meat. The panel ratings were inconsistent, however, and differences were of no statistical significance.

SUMMARY AND CONCLUSIONS

Three conclusions may be drawn from this study. Considering only the loss of weight and loss of drippings occurring in the roasts subjected to these two treatments, results indicated that meat which was precooked and then frozen lost less weight and tended to be more juicy than meat frozen fresh, thawed, and cooked at the time it was to be eaten.

Meat as rated in the study by the Warner-Bratzler mechanical shear was more tender when it was frozen fresh than when it was frozen after cooking. The panel of judges, however, rated the precooked frozen meat more tender.

Results of this study stimulate many questions and ideas for further experimentation. It will be interesting to see these ideas materialize in the future and questions concerning frozen meat be answered.

How Do We Fare with Bills of Fare?[1]

RUTH GORDON

Director, Department of Dietetics and Nutrition, University of Kansas Medical Center, Kansas City

Two kinds of menus are used in hospitals—the set menu, i.e., one menu for all, and the selective menu in which all patients may choose what they wish to eat. Hotels and restaurants have long offered choices in menus; however, hospitals have been much slower to adopt this plan. Although the selective menu for private patients *only* has been used for some time, the choice menu for *all* patients in a 50- to 800-bed hospital is a fairly recent idea.

There are many reasons why it has taken so long for the selective menu to be adopted. Like all things, it has both disadvantages and advantages.

Perhaps the greatest single factor in keeping the single menu is resistance to change. There are so many ramifications involved in the slightest change that we are all prone to "go along" with the old way, even though we would reap greater rewards by changing.

Another advantage, so called, in "staying with" the one-menu idea is that quantities of food to be used can be judged much more accurately than trying to decide which will be the most popular food, the next popular, and so on. Estimating the exact quantities with a selective menu takes practice and research by the dietitian, and even then there will be times when her guess is wrong. Some way must be found to overcome this. If the cafeteria for personnel uses the same menu as for patients, there can be a reserve supply of food which, when necessary,

[1] Presented at the 36th Annual Meeting of The American Dietetic Association in Los Angeles, on August 27, 1953.

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can be used for patients, and substitutes can be made in the cafeteria menu.

Even though in the one-menu system, one may be more accurate in purchasing, the waste can be and often is greater due to people's food dislikes. As we all know, these become exaggerated in illness.

On the other hand, the selective menu promotes higher "food morale" than perhaps any other single factor in hospital food service. The psychologic value of being able to choose cannot be overestimated. When the patient has a choice, it acts as a motivating force; he is inclined to eat what he has chosen, and thereby, perchance, waste is reduced and the patient may be discharged sooner. He has had to assume some responsibility for his welfare, and most persons will respond to responsibility when given the opportunity.

The choice or selection of food does not need to be great. The effect psychologically is about as satisfying when a choice of only two items is provided as it would be if there were four or five. The important point is that a selection can be made. Occasionally one finds a patient who does not like to choose his food and will not do so because he just doesn't want to bother, or he is too ill, or he desires to be surprised. If he doesn't want to be bothered, then perhaps we as dietitians have given him a poor introduction to selective menus. If he is too ill, then we choose for him temporarily. If he wants to be surprised, we follow his wishes. In some cases, of course, this may turn out to be a real surprise; he might be more surprised than pleased!

Still another reason given for keeping a single menu is that it is easier for cooks because they need prepare only one item of food, such as one meat, one vegetable, one dessert, and so on. With a selective menu, the total quantity prepared remains unchanged, but it may be divided into several items. On the other hand, the choice menu does require more equipment; the container may not need to be as large, but more are needed. In limited space, this may present a real problem.

The one-menu-for-all system does not require as skilled employees. With a selective menu, the patient expects to receive the food he has checked; this requires well trained and skilled employees. A breakdown anywhere along the line may result in a bitterly disappointed patient, and certainly no dietitian can afford that. Also, the adoption of the selective menu will slow down the service at first until employees become used to it, but this is only temporary. It seems to me that if we decide to use a choice menu, then it follows as a requirement that extremely well trained workers *must* be used.

The single menu does not require as highly organized a dietary department as does the selective menu. The mechanics for making a choice menu work smoothly require much organization and planning. A system for tallying menus, checking food, and changing diets must be worked out in detail if the menu is to be effective. It is impossible for a dietitian to "get by" with sloppy planning and execution.

The menu which offers all patients a choice provides the opportunity to serve a well liked dish to a minority. For example, when roast beef and lobster à la Newburg are offered, most of our patients in the Middle West prefer beef. But, the few who relish lobster will be doubly pleased. This would be impossible without selection. The selective menu also makes it possible to develop and offer specialties. It must be remembered, however, that even special cinnamon rolls might not be appreciated by all patients—but with a selective menu, each patient can choose what he wants.

The selective menu is also one of the best educational devices that a dietitian has, for the teaching of both normal and therapeutic diets. There is no better method of making the patient responsible for the adequacy of his diet. The adequacy or inadequacy of his diet will show up immediately, and whether inadequacy is due to poor appetite or lack of dietary knowledge is also soon revealed. For therapeutic diets, such as high-protein or bland, the patient is taught to check his menu according to his doctor's prescription. The dietitian can then find out whether the patient has learned and will follow his diet.

At the University of Kansas Medical Center, we have a menu which provides for regular, soft, bland, and full-liquid diets. With it, the patient can choose the kind of diet his doctor has ordered, or, if he is allowed a "diet as tolerated," he can choose the type, texture, and quantity of food he wishes.

Advantages of the Single Menu

Quantities of food to be ordered can be calculated more accurately.
Dietary department does not need to be so well organized.
Employees need not be so skilled.
Less equipment is needed and, therefore, space can be limited.
Preparation is easier for cooks because variety is less.

Advantages of the Selective Menu

There is less waste because patients will eat what they choose.
Morale is improved because everyone, or nearly everyone, likes to choose (psychologic factor).
Educational value in teaching adequate and therapeutic diets is excellent.
A well organized department is a necessity.
Work force must be made up of skilled employees.
Minority receive dishes they like as well as majority.
There is an opportunity to develop and offer specialties.

We dietitians must make our choice. Should it be a selective menu in which *all* may choose or *one* menu for all?

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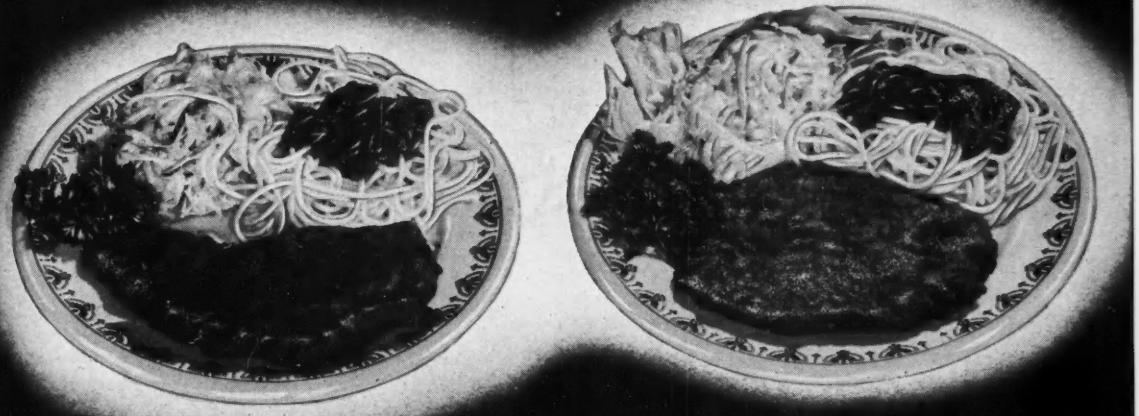

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Book Reviews

Individual and Community Health. By William W. Stiles, M.D., M.P.H. New York: The Blakiston Company, 1953. Cloth. Pp. 492. Price $6.

This is an informative, well written, health education text by a physician with a public health viewpoint. The author stresses the relationship of personal and community health and gives an over-view of the field of medicine and health, with special emphasis on the prevention and control of disease. It is directed to college students to give them the scientific knowledge which will aid them in keeping well throughout life and in developing a social conscience concerning the health of the community. In discussing the community and individual responsibility for positive health, Dr. Stiles emphasizes that we live in "one world" with shrinking boundaries. He refers frequently to the importance of organized health planning in preparation for disaster and civil defense.

The content of this book falls into three broad divisions: first aid, biologic aspects of health, and a review of the social approaches to health. Throughout the text the importance of the individual in the over-all community health program is stressed.

In the chapter on "Disorders of Nutrition, Digestion, and Metabolism," the author states: "Optimal nutrition is essential for the prevention of disease and the maintenance of health. This is just as true for the nation as it is for the individual. . . The world never has enough to eat. At least two-thirds of its inhabitants are malnourished, and many face periodic starvation. . . Hunger begets ill temper, vice, crime, revolution, and war. What can be expected of the next generation when there are now 230 million children throughout the world in desperate need of food and food supplements?" The author further brings out that in this country where food is abundant, many persons are improperly nourished due to poverty, ignorance, and indifference. Others are in a suboptimal nutritional state because of disorders of the digestive and metabolic systems. The philosophy of this chapter is excellent, although the nutrition information is limited.

The chapter on "Food Sanitation" will also be of interest to dietitians concerned with the safe preparation and service of food.

In the opinion of the reviewer this book would serve as a useful reference for health workers and students, for it includes much pertinent medical and health information. The author's explanations in parentheses following the use of technical terms adds to the ease of understanding.—*Mary Reeves, Regional Nutrition Consultant, Children's Bureau, Department of Health, Education, and Welfare, Chicago.*

Food Poisoning and Food Hygiene. By Betty C. Hobbs, Ph.D. London: Edward Arnold & Company, 1953. Cloth. Pp. 174. Price $3.50. (Distributed in the U. S. by St. Martin's Press, New York City.)

This new book by Dr. Hobbs of the Central Public Health Laboratory, London, is a welcome addition to texts in the field. While it is keyed to the problems of food production and service in England (where refrigeration is much less generally available than in the U. S.), it has much to offer to those in food service everywhere.

Short chapters on elementary bacteriology and bacterial causes of food poisoning provide good background material for teaching employees. An excellent chapter discusses personal hygiene of food handlers.

The book is written in non-technical language and with admirable simplicity and directness. Charts and photographs are well selected.—*Maxine McDivitt, Ph.D., Associate Professor of Home Economics, University of Wisconsin, Madison.*

Nutritional Studies in Adolescent Girls and Their Relation to Tuberculosis. By Joseph A. Johnston, M.D. Springfield, Illinois: Charles C Thomas, 1953. Cloth. Pp. 320. Price $7.50.

This book is a report of a twenty-year nutritional and metabolic study, and is a compilation of case studies of adolescent girls who had been exposed to tuberculosis, many of whom were recovering from reinfection. Complete clinical observations, balances of nitrogen and calcium obtained continuously for many months, and basal energy expenditures are recorded and correlated with progress of disease. Because of the long-time character of the studies, it was possible to test the influence on retention of nitrogen and calcium of changes in diet, of vitamin D, of premenstrual growth, of the onset of menstruation, of certain hormones, of activity and rest, and of intercurrent non-tuberculous infection. A short but well chosen bibliography is presented.

Since most of the subjects had tuberculosis of some degree, undernutrition was a factor in the retention patterns, and prolonged bed rest undoubtedly influenced the results. In spite of this and of lack of what might be considered vigorous controls, the time during which each child was studied was longer than usually obtained, and the data are, therefore, of untold value to the research worker in child growth and development and represent a unique contribution to our knowledge of adolescence.

One point of considerable interest to the dietitian is the repeated observation that children who have developed tuberculosis after having suffered nutritional insult do not eat quantitatively even when the ration offered is good, unless there is individual attention to intake of protein and total calories as well as the protective foods. Of equal interest is the fact that in reinfection, tuberculosis occurs in the preadolescent whose food intake has been inadequate to meet growth demands.—*Margaret A. Ohlson, Ph.D., Head, Department of Foods and Nutrition, Michigan State College, East Lansing.*

RECENT BOOKS RECEIVED

The Art of Hungarian Cooking. By Paula Bogany Bennett and Velma R. Clark. New York: Doubleday & Company, Inc., 1954. Cloth. Pp. 223. Price $3.50.

Michael Reese Hospital Diet Manual. Rev. ed. By Dietary Department in conjunction with The Dietetic Committee of the Medical Staff. Chicago: Michael Reese Hospital, 1953. Paper. Pp. 52.

1954 Medical Progress. A Review of Medical Advances during 1953. Morris Fishbein, M.D., editor. New York: The Blakiston Company, 1954. Cloth. Pp. 345. Price $5.

Food Selection and Preparation. 4th edition. By Marion Deyoe Sweetman and Ingeborg MacKellar. New York: John Wiley & Sons, Inc., 1954. Cloth. Pp. 645. Price $6.50.

Navy Recipe Service. Navsanda Publication 7. By Bureau of Supplies and Accounts, Navy Department. Washington: Government Printing Office, 1953. 748 cards, each 5 x 8 in., including title card and separator tab cards. Price $5.

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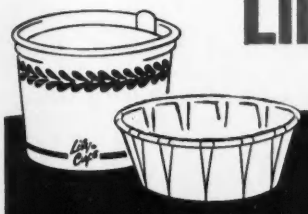

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Current Literature

Contributed by Mildred Bonnell and administrative dietetic interns, University of Washington, Seattle; Janette C. Carlsen and Ethel M. Miller, The Johns Hopkins Hospital, Baltimore; Mary L. Majerus, Dietetic Intern, Veterans Administration Center, Los Angeles; Elizabeth H. Tuft, Wesley Memorial Hospital, Chicago; and the Journal staff

AMERICAN JOURNAL OF DIGESTIVE DISEASES

Vol. 21, January, 1954

* An analysis of insulin (hypoglycemic) reactions in diabetic patients. I. Statistical survey of 203 cases. J. I. Goodman and A. Heller.—p. 9.

Insulin Reactions. Of 203 diabetic patients using insulin, 77 (38 per cent) had had at least one hypoglycemic reaction. Of all 203 patients, 62 were subsequently controlled by diet alone; these had a lower incidence of reactions than the remaining 141. Regular insulin was most commonly used and produced reactions in 14 per cent of its users. Protamine zinc insulin, when used alone, or as a mixture and modification gave reactions in 33 per cent. Of the severe reactions, 81 per cent occurred in the protamine group. Of the labile diabetic patients, 55 per cent had had reactions in contrast to 27 per cent with mild diabetes. It is concluded that the longer-acting protamine zinc insulin and its various mixtures and modifications are potentially more hazardous with respect to the hypoglycemic reactions than the shorter acting, regular and globin insulins.

THE AMERICAN JOURNAL OF THE MEDICAL SCIENCES

Vol. 227, February, 1954

* Pyrimidine metabolism in diabetes mellitus studied with N^{15} labeled uracil. R. Caren and M. E. Morton.—p. 141.
* Dietary eggs and rheumatic fever. A. D. Wallis.—p. 167.

Pyrimidine Metabolism in Diabetes. Alloxan is one of the class of compounds known as pyrimidines which, with purines, are basic components of the nucleic acids. Nucleic acids are found in both the nucleus and the cytoplasm of all cells and so constitute the major metabolic pool of pyrimidines. Alloxan may be considered as an oxidative product of isodialuric acid. Even very small amounts of alloxan slowly formed by such a metabolic process may act on the islets of Langerhans over a long period of time to produce gradual transition into the diabetic state rather than the sudden acute picture which results when alloxan is administered intravenously. Therefore, in the diabetic individual an error of pyrimidine metabolism may occur at the isodialuric acid stage with the production of alloxan or an alloxan-like substance which in turn affects the beta cells of the islets of Langerhans to produce diabetes. (Instead of proceeding along the normal route of metabolism to urea, alloxan may be formed in an abnormal side reaction.) Support to the above hypothesis was given when the comparison was made between the manner in which the uracil was metabolized in the diabetic and in the normal patient where a difference in pyrimidine metabolism was demonstrated. Uracil was broken down much more rapidly to urea in the diabetic patient. However, only about 50 per cent of the isotopic uracil could be recovered, which gives rise to other possibilities.

Eggs and Rheumatic Fever. Because eggs are by far the richest source of the dietary choline necessary for the synthesis of serum phospholipid, which is an active component of the natural serum inhibitor of the streptococcal hemolysin, dietary histories with regard to eggs were taken for 184 patients with rheumatic heart disease and 1380 normal persons. Of the cardiac subjects, 10.2 per cent actively disliked eggs and 40.6 per cent believed they ate few eggs in childhood either from dislike or inaccessibility. Comparable percentages for the control group were 4.6 and 16.3. A history of eating few eggs in childhood was given by 49 per cent of the patients with cardiac damage severe enough to require digitalis and by 51 per cent of these who had had three or more acute episodes of rheumatic fever. However, individual differences not only in choline intake but also in choline requirement may play a part in determining susceptibility to rheumatic fever.

AMERICAN JOURNAL OF MEDICINE

Vol. 16, January, 1954

Liver disease—morphologic considerations. H. Popper.—p. 98.

ANNALS OF INTERNAL MEDICINE

Vol. 40, January, 1954

* Fundamental concepts in the diagnosis of sprue. R. Rodriguez-Molina.—p. 33.

Diagnosis of Sprue. The term "sprue" includes both the tropical and nontropical variety (idiopathic steatorrhea). These syndromes are believed to be manifestations of one disease entity of unknown etiology and modus operandi. In a study of 100 selected cases in Puerto Rico, the author found anemia of variable intensity in all individuals, with macrocytic hyperchromic anemia in 90 subjects. Free hydrochloric acid was present in 95 of the persons studied. The most common symptoms were: abdominal distention, epigastric distress, heartburn, diarrhea, carbohydrate and fat intolerance, glossitis, stomatitis, asthenia, and rapid loss of weight and muscular wasting. Also areas of brownish hyperpigmentation with roughening were frequently observed on face, neck, arms, and legs. Some of the differences between tropical and nontropical sprue are given. The available evidence indicates that pernicious anemia, sprue (tropical and nontropical), celiac disease, nutritional macrocytic anemia, and pellagra are closely related diseases, probably having a common denominator, yet differing significantly in the body systems affected. In all these conditions, gastrointestinal abnormalities, anemia, and nervous manifestations are encountered. Gastrointestinal symptoms are generally more severe in sprue and celiac disease than in pernicious anemia or pellagra; on the other hand, dysfunction of the nervous system affecting the spinal and cerebral pathways is more frequent and more severe in pellagra and pernicious anemia.

ARCHIVES OF INTERNAL MEDICINE

Vol. 92, December, 1953

* Theory of thyroid hormone action. P. Starr and R. Liebhold-Schueck.—p. 880.

Vol. 93, January, 1954

* Clinical usefulness of determination of circulating 17-hydroxycorticosteroid levels. G. T. Perkoff, A. A. Sandberg, D. H. Nelson, and F. H. Tyler.—p. 1.
* Function of pancreatic juice and of bile in assimilation of dietary triglyceride. J. H. Annegers.—p. 9.
Alpha cells of pancreas—morphologic and physiologic considerations. A review. B. W. Volk, S. S. Lazarus, and M. G. Goldner.—p. 87.
Review of rheumatic diseases. H. Waine.—p. 121.

Thyroid Hormone Action. Thyroxine provides calorigenic catalysis for usual needs in a benign environment. When circulating thyroxine accumulates, as indicated by rising protein-bound iodine, thyroid-stimulating hormone activity is proportionately reduced. A failure of inhibition of this mechanism leads to hyperthyroidism. If an abrupt demand for a tenfold increase of calorigenic catalytic activity occurs, a dehalogenating enzyme *in situ* changes the intracellular thyroxine to triiodothyronine, which provides a short period of tenfold calorigenic activity. A failure of this inhibition mechanism causes Grave's disease.

Steroids. The amount of 17-hydroxycorticosteroid in human plasma is markedly increased when death is impending; it is also increased in Cushing's syndrome. Possibly the striking increase in cortical steroids in diabetic coma may bear an etiologic relation to insulin resistance which is common in this disorder. No 17-hydroxycorticosteroid was found in the plasma of seven patients with Addison's disease, and the intravenous injection of corticotropin did not result in appearance of the steroid.

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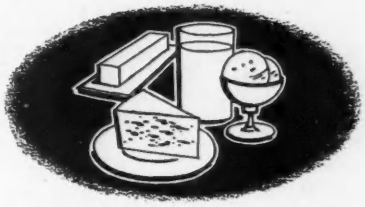

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Function of Pancreatic Juice and Bile. The addition of certain common triglycerides to the diet of normal subjects results in no significant increase in fecal lipid excretion. Therefore, such triglycerides are practically 100 per cent assimilated and fecal lipid is of endogenous origin. When triglyceride (lard) was fed to dogs in the absence of pancreatic juice, only about 60 per cent of this exogenous material was assimilated; in the absence of bile, about 40 per cent was assimilated. Also, depancreatized dogs were unable to assimilate dietary oleic acid as completely as normal dogs. These findings establish the fact that pancreatic juice has some extradigestive function.

BRITISH MEDICAL JOURNAL

No. 4851, December 28, 1953

* Assessment and results of obesity. H. M. Sinclair. —p. 1404.

Obesity. Overweight and obesity are not synonymous. The estimation of obesity by comparing the weight of a person with standards for sex, age (if not adult), and height is often fallacious for several reasons. First, the basis of the standard is often doubtful. Second, body weights are skewed, and the average weight in a group is higher than the central weight. Third, somatotype is very important, since mesomorphs (muscular persons) may be heavier than endomorphs (fat persons) of the same height, and yet have much less body fat. Obesity is satisfactorily estimated by measuring the thickness of a skin-fold. This correlates highly with the density of the body. Overweight is particularly difficult to estimate in children because of the two characteristic growth-spurts and because there is a doubt about what represents optimum nutrition. Obesity shortens life and is accompanied by an increased incidence of accidents and of various disorders, including atherosclerosis, hyperpiesis, diabetes mellitus, chronic nephritis, arthritis, gallstones, and complications in pregnancy and childbirth. Hereditarily obese mice have increased lipogenesis, with consequent overeating; they are analogous to patients with hypothalamic obesity. Later, they develop diabetes and are analogous to the middle-aged, obese, insulin-resistant diabetic person. Increased dietary fat (but not increased dietary cholesterol) tends to raise the serum cholesterol level. Reduction of body weight lowers mortality in overweight persons, and various disorders that are more common in the obese can be diminished by slimming.

FOOD TECHNOLOGY

Vol. 8, January, 1954

* Some recent developments in aluminum foil packaging of foods. J. M. Fultz.—p. 19.
* Powdered grape juice. R. K. Eskew, H. I. Sinnamon, and V. A. Turkot.—p. 27.

Vol. 8, February, 1954

* Low temperature organisms in frozen vegetables. G. J. Hucker.—p. 79.
* Factors influencing tenderness of principal muscles composing the poultry carcass. C. H. Koonz, M. I. Darrow, and E. O. Essary.—p. 97.
* Observations on methods to determine food palatability and comparative freezing quality of certain new strawberry varieties. E. F. Murphy, R. M. Bailey, and M. R. Covell.—p. 113.

Aluminum Foil Packaging. In most of its packaging applications, aluminum foil is combined with another material such as paper, polyethylene, or a plastic film. Some specific applications are discussed, i.e., foil-paper butter wraps; the gravure-printed foil carton overwrap, often a foil-paper-wax combination; and new developments using foil alone. These innovations include tray-type containers used particularly for preparing, reconstituting, and serving prepared or cooked foods and fin-sealed pouches also usable for reconstituting foods. The pouches are coated and heat-sealed, but in the case of the trays—since many food products injure foil—it must be determined whether a coating is needed to protect the metal, and if so, what kind. The manufacture of aluminum foil is also described.

Powdered Grape Juice. While powder is the ultimate in concentrates, fruit juice powder is bulkier than high-density concentrated juice. Therefore, researchers in a U.S.D.A. pilot-plant study of grape juice knew mere drying isn't enough. For public acceptance, their powder needed not only superior high-temperature storage qualities but also rapid solubility and a good, grape-like taste and aroma. The process is described in full. While storage tests are not yet conclusive enough to permit commercial use of the product, keeping quality at 73°F. appears excellent. The reconstituted juice looks like Concord grape juice and has a strong, pleasing flavor somewhat different from the bottled juice.

Organisms in Frozen Vegetables. Asparagus, broccoli, Brussels sprouts, cauliflower, corn, peas, snap beans, and squash were recently studied to determine the numbers and types of organisms in frozen vegetables stored over long periods. The 195 samples, of which 96 had been in freezer storage five years or longer, were studied for freeze-resistant organisms and the possible presence of psychrophilic types. The predominating type, of 280 organisms isolated, was found to be Gram-negative rod, resembling the *Flavobacterium estereoromaticum* types but without their fruity aroma.

Tenderness of Poultry Muscle. Shear readings and organoleptic ratings indicated a tenderness pattern for many of the principal poultry muscles during the early post-mortem period. Relative tenderness was found within 24 hr. or less after the birds were dispatched, although freezing delayed complete tenderization until tissues were defrosted. Cutting into muscles or immersing birds in hot water delayed and lessened tenderness, respectively. The reasons for this are not clear, but, if early post-mortem toughness depends entirely on rigor, such treatment may interfere with the resolution of rigor. The information in this article should shed some light on the problem of tenderness in meats. (Poultry itself is now handled by methods permitting time for resolution of rigor and consequent tenderness; therefore, the practical value of the results as applied to poultry is doubtful.)

Evaluating Strawberries. Quick-frozen fruits of four strawberry seedlings were judged for texture, color, and flavor. The ranking technique was used by the judges; however, some judges also scored the samples. Ranking was found preferable, especially for firmness. A known desirable variety of berry was included as a point of reference. Two of the varieties, Monmouth and Maine 55, were recommended for freezing preservation; the other two were of inferior freezing quality. Addition of 0.15 per cent low methoxyl pectin to 60 per cent sirup did not produce a detectable effect on the texture, color, and flavor of the fruit.

JOURNAL OF AGRICULTURAL AND FOOD CHEMISTRY

Vol. 1, October 14, 1953

* Better nutrition through education. H. E. Robinson.—p. 922.
* Dehydrated foods, chemistry of browning reactions. J. E. Hodge.—p. 928.

Vol. 1, October 28, 1953

* Composition of rice. Influence of variety and environment on physical and chemical composition. E. R. McCall, J. F. Jurgens, C. L. Hoffpauir, W. A. Pons, Jr., S. M. Stark, Jr., A. F. Cucullu, D. C. Heinzelman, V. O. Cirino, and M. D. Murray. —p. 988.

Vol. 2, January 20, 1954

* Milk proteins, effects of heat treatment on serum proteins. R. Jenness.—p. 75.
* Antioxidants, new developments for food use. H. R. Kraybill and L. R. Dugan, Jr.—p. 81.

Vol. 2, February 3, 1954

* Cottonseed food supplement. Nutritive value of bread and cookies containing cottonseed flour. M. Womack, M. W. Marshall, and J. C. Summers. —p. 138.
* Science in the kitchen. Perspective. M. I. Barber. —p. 160.

Better Nutrition through Education. Over the past fifty years there have been outstanding achievements in health progress in America. Sanitation, immunization, sulfa drugs, and antibiotics have played a leading role in bettering the health of our population and increasing life expectancy. But these are all external factors; the only force which can build from within the body is better nutrition. To have this we must educate people on the rewards of right eating and practicing thoughtfully and carefully the best nutritional regimen possible. A suggestion is made for the food industry to form a nutritional educational foundation conducted along the same lines of the high policy standards set by The Nutrition Foundation.

Browning Reaction Theories. Dehydrators would think of browning as an undesirable reaction; however, coffee, fresh bread crust, roasted nuts, and so on, could not be identified without the "browned" flavor and odor. Control of browning—the ultimate goal of browning research—can only come about as the reaction mechanisms are better understood. As a step toward eventual solution, this review discusses the reactions involved in browning, proposes a mechanism for browning in sugar-

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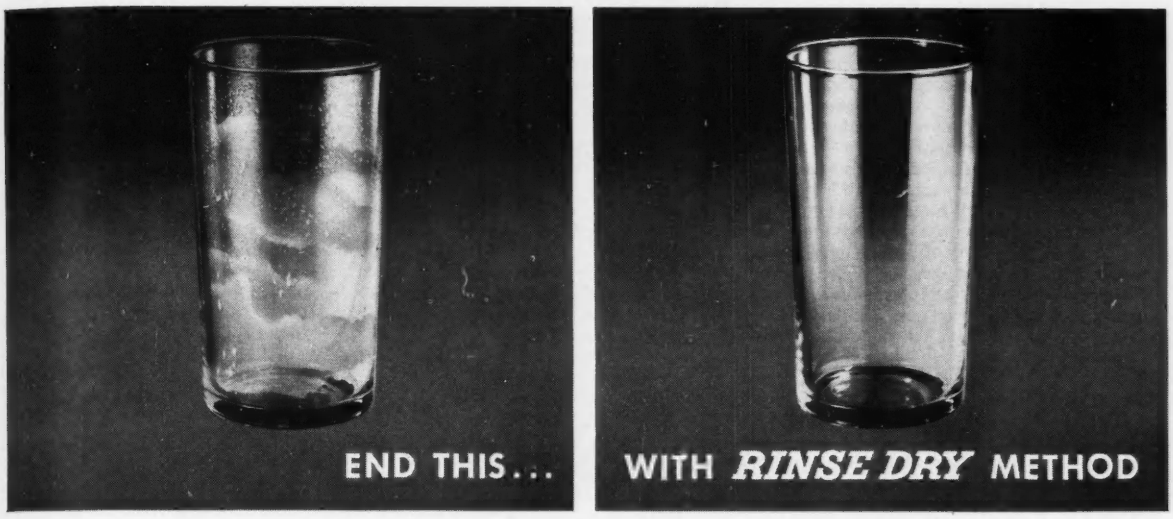

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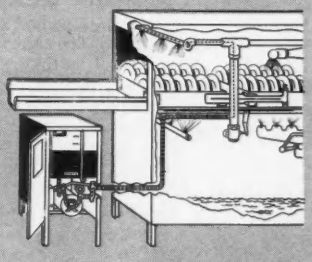

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amine systems which correlates the known reactions, and points out important unexplored areas.

Rice Composition. Eight varieties of rice grown for three years at three locations were examined to learn the effects of variety and environment. Both had a highly significant effect on the milling yields, on yields of true anatomical fractions of the rice grain, on the ash content of the hulls, on the lipide of the pericarp plus germ, and on the nitrogen content of the endosperm. Highly significant relations were found between environment and ash content of pericarp plus germ, starch content of the endosperm, and ash and lipides of the endosperm. Variety had no significant effect on these three factors. White rice was low in total phosphorus (with a considerable portion of it in the form of phytin phosphorus) while rice bran was high. Trace elements present in all samples included aluminum, copper, iron, manganese, barium, boron, and zinc. Tin was found in the white rice and bran samples but not in the hulls. Greater concentration of trace metals was found in the bran than in the white rice, while concentrations in the hulls were intermediate. Statistical analysis did not indicate any significant influence of variety or environment on the amounts of the inorganic constituents.

Effects of Heat on Milk Serum Proteins. The effects of heat on the proteins of milk serums are discussed in relation to cooked flavor, antioxygenic properties, and impairment of coagulation of the casein. The milk serum proteins were denatured by heat treatments in the range of 60° to 80°C. for times up to 2 hr. Many of the sulfhydryl groups of β-lactoglobulin were activated by heat treatment to such an extent that they were oxidizable by atmospheric oxygen. Denaturation of β-lactoglobulin, as measured by sulfhydryl activity, followed first-order kinetics and had an activation energy of about 80,000 calories per mole. The activation of sulfhydryls paralleled the decrease in solubility. The activated $-SH$ groups may function as antioxidants in dairy products but the effect of serum proteins on bread does not involve $-SH$ groups, as was formerly thought to be the case.

Antioxidants for Food Use. The use of antioxidants is not only important in retarding rancidity in food fats and foods containing fats, but also in conserving nutritive values. Some of the more recent developments of antioxidants in foods are butylated hydroxyanisole and 2,6-di-*tert*-butyl *p*-cresol, two synthetic antioxidants, which have excellent "carry through" properties. Butylated hydroxyanisole is now used extensively in lard and other edible fats, breakfast cereals, fried corn crisps, potato chips, and nuts, and to treat paraffin-coated wrappers and paper wrappers used in food containers. It is estimated that currently at least 50 per cent of the federally inspected lard produced in this country is stabilized with this antioxidant.

Cottonseed Food Supplement. The nutritive value of bread and cookies containing cottonseed flour is reported. A table shows the average changes in weight in twenty-eight days and the nitrogen efficiencies of animals fed bread or cookies made with or without the addition of cottonseed flour. White bread made with either 10 parts of cottonseed flour or 4 parts of milk solids per 100 parts of wheat flour will improve, to about the same extent, the protein quality as measured by rat growth. Where protein supplies are limited and where milk solids are not available, cottonseed flour of the quality used in these experiments might prove useful in enhancing the protein quality of bread.

Science in the Kitchen. Appreciation of the contributions of science to daily living rarely occurs to most homemakers. However, scientists rarely explain simple kitchen procedures and questions in language that such women can understand. It is suggested that the scientists might learn something if they would talk to an audience of homemakers, for there are "thousands of other persons who have minds that are receptive and who might be a strong influence in furthering research." A day's menu is presented which illustrates the many ways science helps with the meals, and some of the mechanical labor-saving devices are listed.

JOURNAL OF THE AMERICAN GERIATRICS SOCIETY

Vol. 1, December, 1953

* Improvement in longevity in elderly patients with fracture of the hip. R. Goldsmith, J. A. Sterling, and L. H. Block.—p. 869.

Improved Longevity in Hip Fractures. Based on experience with 234 cases, the factors in management which are important in favoring survival of the older patient who sustains a hip fracture are presented. Early operative fixation in properly selected and adequately prepared patients is stressed. If surgery seems contraindicated, there should be immediate nonoperative fixation. The use of anticoagulants has been of great value. Special efforts should be made to maintain normal nutrition and hydration. Patients with feeding problems are prone to develop complications, including anemia and hypoproteinemia. Such anemia is intractable to drug therapy but responds to high-protein intake. Of all the factors necessary in treating such patients, the authors consider nutrition the most important.

THE JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION

Vol. 154, January 9, 1954

* A statement of general policy concerning the addition of specific nutrients to foods. Council on Foods and Nutrition.—p. 145.

Vol. 154, January 16, 1954

* Sterilization of infant feeding bottles and nipples. Foreign Letters.—p. 259.

Vol. 154, January 30, 1954

* Convulsive seizures in infants with pyridoxine-deficient diet. D. B. Coursin.—p. 406.

Addition of Nutrients to Food Beneficial. The Food and Nutrition Board and the Council on Foods and Nutrition report that the addition of specific nutrients to certain staple foods has been beneficial to the nation's health and has encouraged sound nutritional practices. However, they emphasize the desirability of meeting nutritional needs by use of natural foods as far as practicable. To avoid undue artificiality of food supply, foods chosen as vehicles for the distribution of additional nutrients should be those which suffer loss in refining or other processing. The enrichment of flour, bread, degerminated corn meal, and white rice; the retention or restoration of thiamine, niacin, and iron in processed food cereals; and the addition of vitamin D to milk, of vitamin A to table fats, and of iodine to table salt are endorsed by the Council.

Sterilization of Feeding Bottles and Nipples. The relative value of boiling and of hypochlorite treatment for the sterilization of infant feeding bottles and nipples has been investigated. Plate counts and overnight broth cultures of bottles and nipples obtained from hospitals using the different methods were made. Of the 56 bottles sterilized by the boiling method, the plate count was sterile in 82.1 per cent; for the 113 nipples treated by boiling, 47.8 per cent. Of the 130 bottles treated by the hypochlorite method, the figures were 85.4 per cent sterile, and for the 87 nipples treated by this method, 79.3 per cent. However, it is pointed out that initial sterility of bottle and formula does not guarantee a bacteriologically safe feeding and that there is good reason for using heating methods in which the milk is autoclaved in the bottle with the nipple fitted before the bottle is given to the infant.

Pyridoxine-Deficient Diet. A study of a syndrome of hyperirritability and convulsive seizures in fifty-four infants is presented. Symptoms occurred in infants fed a liquid SMA preparation, which consists principally of defatted cow's milk, vegetable and animal fats, and vitamins plus iron, but contains insufficient pyridoxine. When the diet was changed to evaporated milk formula, symptoms disappeared. Use of pyridoxine intramuscularly or orally in nine patients resulted in disappearance of symptoms also. Thus valuable empirical evidence of infants' need for pyridoxine was obtained. Then, one patient who experienced status epilepticus which was clinically and electroencephalographically demonstrable, improved after pyridoxine intramuscular injection. This provided the final link in the chain of evidence supporting the syndrome as being the result of a specific deficiency. Additional work to determine minimal daily requirements for pyridoxine in infancy is needed.

JOURNAL OF BIOLOGICAL CHEMISTRY

Vol. 206, January, 1954

* Factors other than choline which affect the deposition of liver fat. A. E. Harper, W. J. Monson, D. A. Benton, M. E. Winje, and C. A. Elvehjem.—p. 151.

* Some interrelationships of aspartic acid, threonine,

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and lysine. J. M. Ravel, L. Woods, B. Felsing, and W. Shive.—p. 391.

* The amino acid requirements of man. V. The role of lysine, arginine, and tryptophan. W. C. Rose, W. J. Haines, and D. T. Warner.—p. 421.

Deposition of Liver Fat. The results of a study of some of the factors which modify the action of threonine in reducing liver fat deposition in rats are reported. Low-casein diets containing choline were used, with supplements of various amino acids. The amount of tryptophan and the amount of casein modified the effectiveness of threonine in reducing the deposition of liver fat. As the protein level was increased, the effectiveness of a constant amount of threonine in reducing fat deposition increased. When glycine, betaine, or a large amount of choline was added, none was found as effective as threonine alone in reducing fat deposition. However, in combination with threonine, each resulted in a greater reduction in liver fat than with threonine alone.

Interrelationships of Amino Acids. A study of the interrelation of aspartic acid and threonine in Lactobacilli in which aspartic acid biosynthesis can be controlled by biotin deficiency was undertaken and extended to include some transformations involving lysine. Since neither amino acid completely replaced the other, but both had some activity alone, an interrelationship between threonine and lysine appeared to exist. Under the testing conditions, both organisms synthesized adequate amounts for aspartic acid growth in the presence of supplements of biotin, threonine, lysine, and biocarbonate. The effect of biotin on the aspartic acid requirement and on the ability of lysine and threonine to spare aspartic acid suggests an additional role of each of these amino acids in the utilization of biotin.

Amino Acid Requirements of Man. Nitrogen balance studies in normal young men have demonstrated that lysine and tryptophan are indispensable dietary components. The other essential amino acids are: valine, leucine, isoleucine, threonine, methionine, and phenylalanine. Although essential for rats, arginine and histidine are not necessary in man for the maintenance of nitrogen balance.

JOURNAL OF HOME ECONOMICS

Vol. 46, January, 1954

* Assignment in Freedom Village. B. Kennon.—p. 27.

Vol. 46, February, 1954

* Time and money costs of meals using home- and prekitchen-prepared foods. G. S. Weiss.—p. 98.

Feeding Repatriated P.W.'s. An Army dietitian was assigned to thirty-day temporary duty in the "tent city" of Freedom Village where the first repatriated prisoners of war were received. Her equipment for feeding these men included two field ranges, two tables, two immersion heaters, and some small items. The ambulatory men received a bland diet of tender roast beef, mashed potatoes, peas, ice cream, bread, and milk. Litter patients received only soup and milk. All servings were small and patients were warned against overeating. Between 75 and 600 persons were fed daily. Because the mealtime stretched from 10 A.M. to 3:30 P.M., it was possible to cook in very small quantities. Since this was the first American food the patients had received since their capture by the North Koreans, it was interesting to note that they ate the meat first but seemed most thrilled over the fresh bread.

Costs of Home- and Pre-Prepared Foods. A test was made by feeding a family of four a day's meals purchased in three forms: with as little advance preparation as possible, partially prepared, and ready-to-serve foods. The saving in time from using prepared foods was large compared with the added cost. The home-prepared form cost 90 cents less than the partially prepared form and $1.80 less than in the ready-to-serve form. But the home-prepared meals took 2.4 hr. more time than did the partially prepared, and 3.9 hr. more than the ready-to-serve meals. It is suggested if homemakers did experimenting of their own, their own menu patterns and work habits and their families' standards could be adapted to take advantage of the savings in ready-to-serve foods.

THE JOURNAL OF NUTRITION

Vol. 51, December, 1953

* Studies concerning the pyridoxine requirements of rats receiving highly processed rations. D. V. Tappan, U. J. Lewis, A. H. Methfessel, and C. A. Elvehjem.—p. 479.

* Further evidence as to the possible mechanism involved in the growth-promoting responses obtained from antibiotics. R. L. Jacobs, J. F. Elam, G. W. Anderson, L. L. Gee, J. Fowler, and J. R. Couch.—p 507.

* Influence of various carbohydrates on the utilization of low protein rations by the white rat. II. Comparison of several proteins and carbohydrates. Growth and liver fat. A. E. Harper, W. J. Monson, D. A. Arata, D. A. Benton, and C. A. Elvehjem.—p. 523.

* The Vanderbilt cooperative study of maternal and infant nutrition. I. Background. II. Methods. III. Description of the sample and data. W. J. Darby, P. M. Densen, R. O. Cannon, E. Bridgforth, M. P. Martin, M. M. Kaser, C. Peterson, A. Christie, W. W. Frye, K. Justus, G. S. McClellan, C. Williams, P. J. Ogle, P. F. Hahn, C. W. Sheppard, E. L. Carothers, and J. A. Newbill.—p. 539.

* The Vanderbilt cooperative study of maternal and infant nutrition. IV. Dietary, laboratory and physical findings in 2,129 delivered pregnancies. W. J. Darby, W. J. McGanity, M. P. Martin, E. Bridgforth, P. M. Densen, M. M. Kaser, P. J. Ogle, J. A. Newbill, A. Stockell, M. E. Ferguson, O. Touster, G. S. McClellan, C. Williams, and R. O. Cannon.—p. 565.

Vitamin B_6 and Processed Rations. A study was made of the vitamin B_6 requirements of rats receiving highly processed rations. The Army combat ration, type K, was used, and each item comprising the ration was studied to determine whether it might be contributing heavily to the peculiar vitamin need. The ham and egg and pork units seem to be associated with the unusual vitamin needs which the ration fosters. These protein constituents, however, did not increase the vitamin B_6 need of the animals in the absence of the other portions of the ration. Although the fat was partly responsible for the low growth rate supported by the K ration, it too had little influence on the vitamin B_6 needs of the animals receiving this ration. By substitutions of other meat or meat mixtures for the pork unit, marked improvement in the K ration is possible.

Antibiotic Response. Experiments were performed to determine the effect of feeding antibiotics on the weights of chicks and the clostridia population in the intestinal tracts in a clean environment. Oral administration of penicillin, erythromycin, aureomycin, bacitracin, chloromycetin, furazolidone, or *p*-chlorophenylarsonic acid failed to stimulate the growth of chicks reared in clean quarters. These supplements likewise failed to decrease the total number of clostridia present per gram of feces. Further evidence shows that antibiotics stimulate growth by reducing the total number of clostridia in the intestinal tract of the chick and are ineffective in stimulating growth in a clean environment where the clostridia population is low.

Carbohydrates, Growth, and Liver Fat. The influence of the type of dietary carbohydrate on growth, liver fat deposition, and liver xanthine oxidase activity of rats fed low-protein diets has been studied. Dextrin supported better growth of rats than sucrose, whether the protein in the diet was supplied as casein, egg albumin, or wheat gluten or whether a mixture of amino acids simulating casein was used. With low-casein diets, cerelose supported growth which was intermediate; with fructose, growth was slightly below that obtained with sucrose. The liver fat deposition of rats fed low-casein diets or amino acid diets of similar composition was reduced when the sucrose in the diet was replaced by dextrin. The implications of the results are discussed and it is suggested that each of these observations can be explained as a result of improved utilization of dietary protein when the sucrose in low-protein diets is replaced by dextrin.

Vanderbilt Study of Maternal and Infant Nutrition. The first paper of the Vanderbilt Cooperative Study is concerned with the background, design, methodology, and population sample of a study of nutrition in pregnancy. This study embraces 2338 pregnant white women in the prenatal clinic of the Vanderbilt University Hospital during the period from September 1945 to February 1949. The patients were from families of low to moderate income status. The second paper describes the nutritional characteristics of the study group of 2129 subjects as indicated by records of their dietary intake, laboratory assessments, and physical examinations. These findings are discussed in relation to the altered physiology of pregnancy.

The physical findings have been studied in relation to examiner differences, season, trimester, age, and parity. It is evident that there are but few individual diagnoses that may be related to the nutritional status of pregnancy. The majority of significant differences were due to either individual examiner

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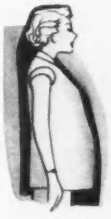

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variations, to known physiologic processes occurring during the reproductive interlude, or to the closely interrelated factors of age and parity. No instances of clinically recognizable deficiency diseases were encountered. Throughout the study, the average number of calories consumed decreased during pregnancy. This may be a reflection of appetite or the result of advice given by physicians in the clinic. Higher intakes of food were noted in the fall and winter than in spring and summer. Serum ascorbic acid concentration showed on the average a decrease during gestation, followed by a further decline by the sixth week post partum. Especially low ascorbic acid values occurred in lactating women. Low values of serum vitamin A were much more frequently encountered in pregnant women than in the non-pregnant members of a population. In the present series, the mean serum vitamin A values decreased during pregnancy and then rose. These post-partum values for serum vitamin A and carotene were higher than the levels observed for non-pregnant, non-lactating women in an adjacent county in 1944. These changes reflect metabolic phenomena. A downward trend in relation to week of gestation occurred in the median thiamine excretion following an oral test dose, but this trend was not great. Riboflavin excretion was one of the measurements in which there occurred a gradual, progressive time trend.

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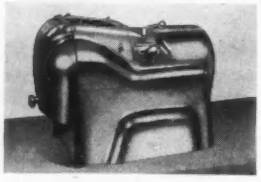

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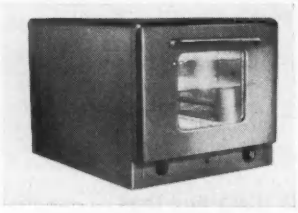

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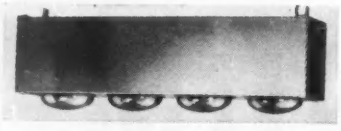

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JOURNAL OF PEDIATRICS

Vol. 44, January, 1954

* A study of the comparative response of young infants to human milk and to various types of cow's milk formulas. M. A. Hatfield, R. A. Simpson, and R. L. Jackson.—p. 32.

Human Milk and Cow's Milk Formulas. Healthy newborn infants, breast-fed or fed one of five isocaloric formulas of cow's milk with water and dextrin-maltose added, were observed for the first six days of life. All 180 of the infants were vigorous and made satisfactory progress. The breast-fed infants had a greater weight loss from birth weight and a slower weight gain, but less irritation of the buttocks than the formula-fed infants. There were no significant differences in the clinical responses of the newborn infants fed the five formulas except that those fed the fresh cow's milk after the fourth day had a slightly lowered incidence of redness of the buttocks than those receiving the evaporated milk preparations. Thirty-three healthy infants who also were fed these formulas were observed in the outpatient clinic. These infants ranged in age from one to eight weeks. All formulas were well tolerated, and the infants made adequate growth. Stools were more frequent during the first two weeks than at a later age, regardless of formula. All of the evaporated milk preparations yielded a softer stool than did fresh cow's milk or frozen evaporated milk formulas. The convenience of using the commercially prepared formulas, which not only saved the mothers much time but also eliminated the possibility of clogged nipples, more than compensated for any additional diaper care which might have resulted from the softer stools.

THE JOURNAL OF SCHOOL HEALTH

Vol. 24, January, 1954

* Organic composition of saliva as a possible factor in the development of dental caries. N. C. Turner.—p. 18.

Composition of Saliva. The relationships of differences in certain organic units of saliva and other body fluids which play a role in susceptibility to dental caries are presented. A significant association between dental caries proneness and the speed with which salivary amylase breaks starch as tested with iodine solution was noted, as was a relation between a quinone-producing factor in saliva and dental caries proneness. Titratable acidity of resting saliva was less closely and consistently related to caries occurrence than was titratable alkalinity or buffering capacity.

NURSING OUTLOOK

Vol. 2, January, 1954

* How to make a board meeting interesting. M. R. Kimball.—p. 24.

Better Board Meetings. Interesting and interested board members are the *sine qua non* of interesting board meetings. Once coordinated into a team, members should be assigned jobs suited to their interests and capabilities,

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and the scope of each project should be considered. Sufficient thanks to members should not be overlooked. What happens at board meetings is often not so important as what happens between them, because mental preparation is essential to real discussion. A good board operates with minimum directive interference and maximum participation. It understands its function, is continually awake to its organization's position among similar groups, and brings members' individual viewpoints into reasonably good focus.

NUTRITION

Vol. 7, Winter, 1953

* Dietary "fibre" and pregnancy toxæmia. E. H. Hipsley.—p. 168.
* Meals services for old people. D. Newman.—p. 173.
* Fighting food faddism. J. Yudkin.—p. 186.

Dietary Fiber and Pregnancy Toxemia. Evidence is presented which indicates that there is a relationship between diet and the toxemia of pregnancy. In 1941, Ebbs, Tisdall, and Scott found that toxemia and the incidence of stillbirth and neonatal deaths are more common in women with poor diets than in those with good diets. In Sydney, it was noted that eclampsia was more common from May to September (winter), when fruit and vegetables were scarce than from November to March (summer). In 1942, when there was a severe shortage of vegetables, the incidence of eclampsia was comparatively high, and the combined stillbirth and neonatal deaths reached record heights. However, in New Guinea, where native diets are predominantly vegetarian, toxemia is very rare. During the war in Hong Kong, eclampsia rose to almost epidemic proportions, and it is interesting that there was a change from a mixed diet to one of polished rice at that time. Charts are given of various countries, their diets, and their rate of eclampsia. Most of the figures show that toxemia of pregnancy is more common where the fiber content of the diet is low.

Meals for Older People. Two welfare committees in England have provided various ways for the feeding of the aged. In some areas, voluntary workers shop for those able to do their own cooking and in others the committee has arranged a taxi shopping service. When old people are temporarily immobilized by sickness, the provision of a meal is undertaken by an appointed "good neighbor." Most frequently, however, the meals are supplied to the old people in their homes. These meals are cooked in central kitchens and delivered by private cars or vans by voluntary workers. Luncheon clubs are also becoming increasingly numerous. Here the meals are supplied in bulk from restaurants and individually served by volunteer labor.

Fighting Food Faddism. A brief review is given of common nutritional fallacies and of the thousands who believe them. One of the best ways to combat these beliefs, it is stated, is by trained nutritionists with a sound academic background and a full appreciation that nutrition is concerned with what people eat. As well as providing the source from which can be drawn the teachers in nutrition at all levels, it is thought that the existence of trained nutritionists might in time influence those with administrative responsibility to realize the significance of the science of nutrition. The syllabus for the new degree of B. Sc. (Nutrition) at Queen Elizabeth College is explained in detail.

NUTRITION REVIEWS

Vol. 12, January, 1954

* Early experiences with ascorbic acid—a retrospect. C. G. King.—p. 1.
* Serum chemistry in kwashiorkor.—p. 5.
* Dietary influences on the composition of the saliva. —p. 7.

Fat absorption in absence of bile and pancreatic juice.—p. 28.

* Metabolic rate in diabetic acidosis.—p. 31.

History of Ascorbic Acid. Early work on vitamin C consisted partly of concentrating the vitamin from lemon juice which showed that it behaved as an anion with a diffusion rate comparable to glucose. By the fall of 1931, small yields of crystalline material were obtained that retained constant activity at a dosage level of approximately 0.5 mg. per day. Experiments showed the product to be identical with a "hexuronic acid." Two weeks after publishing the paper stating that a vitamin had been isolated, a letter arrived from Hungary showing that "hexuronic

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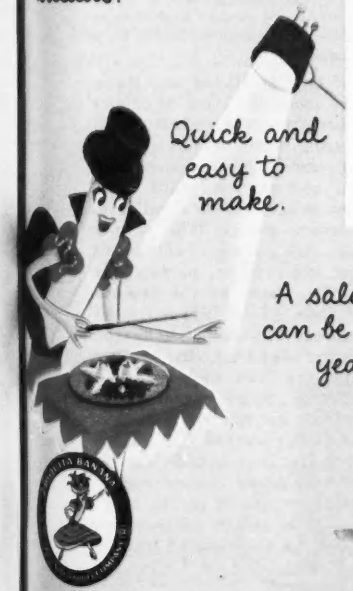

Quick and easy to make.

BANANA COTTAGE CHEESE SALAD

1 ripe banana*
2 balls or scoops cottage cheese
Paprika
Parsley
Salad greens
1 slice stuffed olive
2 pimiento strips

Peel banana and cut lengthwise into halves. Place halves, cut side up, side by side, in center of salad plate. Place ball or scoop of cottage cheese at each end between the banana halves. Sprinkle cheese with paprika and top with small sprigs of parsley. Garnish with crisp salad greens, a slice of stuffed olive and pimiento strips. Serve with sweet or tart salad dressing. One serving.

**Use fully ripe banana . . . yellow peel flecked with brown.*

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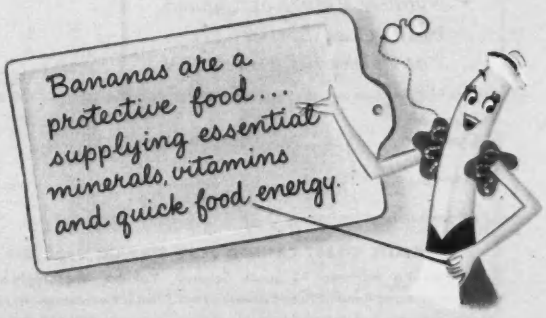


acid" prepared from adrenal glands was protective against scurvy, when fed to guinea pigs at a level of 1 mg. per day. More reports on this vitamin followed rapidly. Among the most interesting discoveries from these early analytic studies was the finding that the vitamin was distributed according to a remarkably uniform pattern in the respective tissues of nearly all animals, including those that required the vitamin as an essential nutrient and those which were not subject to scurvy but maintained a continuous tissue synthesis.

Serum Chemistry in Kwashiorkor. Recently an extensive biochemical investigation was reported in order to establish more accurately the disturbances associated with uncomplicated Kwashiorkor and to follow the effects of treatment of the disease with appropriate diet. Children, who conformed to the clinical description of the disease, were treated with a low-fat, high-protein diet. The average total serum protein was 3.98 gm. per 100 ml. as determined on the first two days of treatment, but by the twenty-first day the normal value of 7.0 gm. per 100 ml. had been reached. The albumin fraction rose to 3.6 gm., and the globulin fraction rose to 3.60 gm. during treatment. Levels of blood urea rose to a peak of 60 mg. per 100 ml. and blood cholesterol rose to an average of 140 mg. per 100 ml. Alkaline phosphatase serum values increased to 18 King-Armstrong units. Serum amylase increased to about 100 units and serum esterase to 40 units during treatment. Thus, the lack of dietary protein can be considered responsible for most, if not all, of the biochemical defects that are characteristic of Kwashiorkor.

Influences on Saliva. The influence of the ingestion of single amino acids on the salivary concentration of that particular acid was investigated. The free amino acids studied were: isoleucine, tryptophan, valine, threonine, cystine, lysine, arginine, leucine, histidine, tyrosine, phenylalanine, and methionine. The saliva levels of each of these acids were found to be significantly increased 2 min. after ingestion; however, the concentrations were back to normal levels within 30 to 60 min. These and other studies on the relation of systemic alteration to the composition of saliva clearly demonstrate the variability possible in the composition of saliva and the selective ability of the salivary glands to elaborate saliva both at rest and during stimulation.

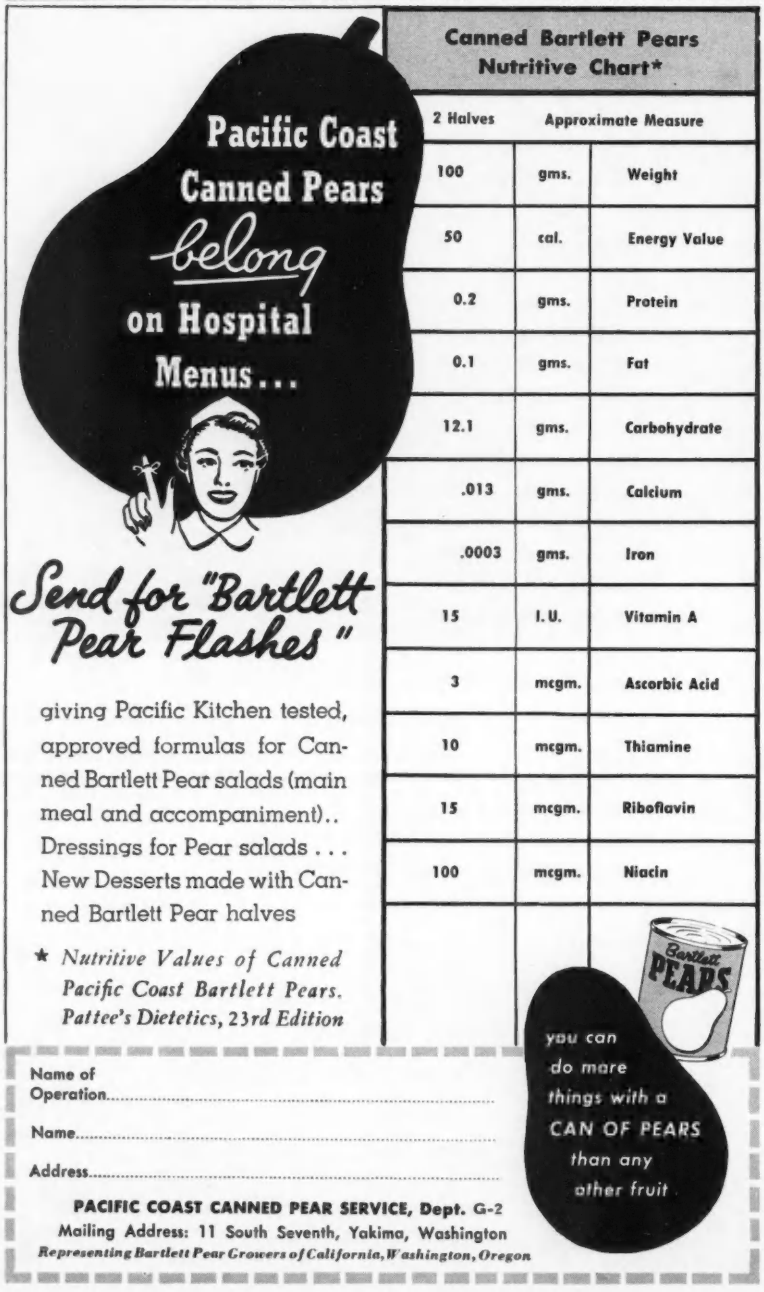
Metabolic Rate in Diabetic Acidosis. Energy metabolism measured by oxygen consumption and basal metabolic rate in patients with diabetic acidosis was found to be much higher than that of hospital patients without diabetes. The subjects inhaled ambient air and expired into a Tissot spirometer. The expired air was analyzed for oxygen and carbon dioxide in the Haldane apparatus. The possibility that there is an impaired synthesis of high energy phosphorus compounds in the absence of insulin suggested that the conversion of oxidative energy to work through energy-rich phosphate might be impaired in diabetic acidosis and "an acceleration of oxidative processes might be necessary to maintain normal cellular function."

SCIENCE

Vol. 119, January 15, 1954

- Factors influencing the uptake of iron by blood and by bone marrow cells *in vitro*. G. H. Ellis, C. S. Brandt, and E. J. Thacker.—p. 94.
- The multiple etiology of obesity: Production of two types of obesity in littermate mice. J. Mayer and C. Y. Zighera.—p. 96.

Uptake of Iron in Blood and Bone Marrow. The mode of action of copper in iron metabolism was investigated. The blood cells were obtained from rabbits that were bled repeatedly to increase the reticulocyte count. The blood marrow cells were obtained from chicks or turkey poults. The results showed that the addition of copper increases the iron uptake, particularly with fewer cells. Reducing the amount of iron had little effect. Where copper was present, fewer cells took up more iron than did larger numbers. In another trial, halving the iron approximately halved the uptake. Similar results were found with bone marrow cells. It was evident that as the level of iron supply was increased, the iron uptake was increased. Increasing the copper supply did the same, particularly at the lower level of iron. The uptake of iron was greatly reduced as the time of incubation was shortened.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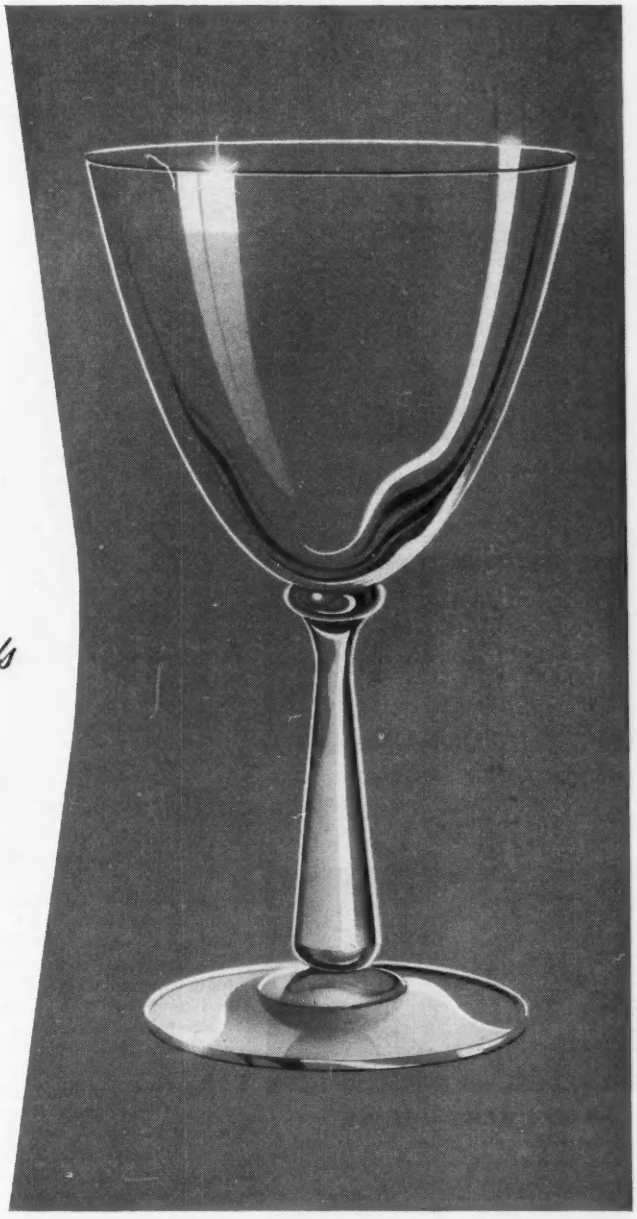

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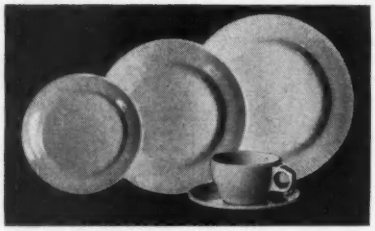

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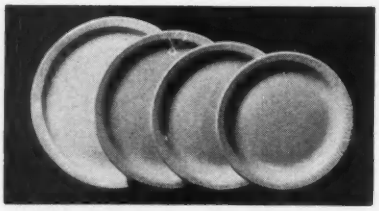

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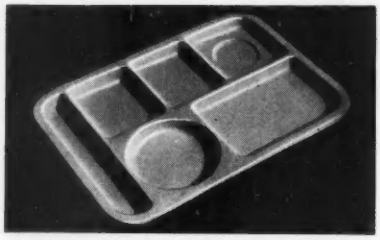

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Two Types of Obesity in Mice. A comparison between two types of obesity in different strains of mice and the establishment of these two types in littermate animals is reported with direct comparison of metabolic characteristics. The goldthioglucose obese animals did not show hyperglycemia as do the hereditarily obese hyperglycemic animals. The fact that this difference does not simply reflect strain idiosyncracies is demonstrated by the fact that the littermates of *ob ob* mice made obese by goldthioglucose showed blood glucose levels in the normal range. Similarly, goldthioglucose obese animals, whether Swiss or littermates of *ob ob* mice, did not exhibit any increase in blood glucose when treated with growth hormone, as do mice with the hereditary obese hyperglycemic syndrome. The profound metabolic difference between the two types of obesity (hereditary and chemically produced) is all the more striking in that the siblings are completely identical in external appearance. Thus obesity appears to be the common end-result of syndromes of profoundly diversified etiologies.

AMERICAN RESTAURANT MAGAZINE

Vol. 38, February, 1954

* Mass feeding in business and industry. C. E. Blackburne.—p. 54.
* Oven-roast hamburgers.—p. 57.
* Meals that are feasts for the eyes. I. L. Dolan.—p. 60.
* A report on the freezing of prepared foods. E. H. Dawson, G. L. Gilpin, G. C. Schlosser, J. C. Lamb, and M. C. Endersbee.—p. 62.

In-Plant Feeding. Three-shift plants need three-shift food service; without it, night workers suffer nutritionally and palate-wise from stale food. Eating habits should be studied and meal schedules adjusted to conform with the needs of the majority. Space determinations are noted, as well as coefficients for kitchen meal load and dining room seating for plants of various sizes. A flow chart shows the progressive relation of factors determining the most suitable types of facilities for any given plant; i.e., number of meals to be prepared, meal pattern, length and number of lunch periods, plant area and distribution of employees, and finances. Each factor is discussed briefly. The author stresses the space economy of staggering lunch periods, and notes the merits of centralized vs. decentralized service for various types of plants.

Oven-Roasted Hamburgers. Aluminum foil is the key to success with oven-roasted hamburgers, which U.S.D.A. school lunch specialists developed to solve the problem of quantity hamburgers without a grill. The preparation and cooking method, shown in recipe form and by photographs, is suitable for institutions. A scoop is used for portioning the patties, which are said to taste more like roast beef than grilled hamburger.

Peaches. Canned cling peaches, at home at any meal, add low-cost glamor to the menu. Eight salad and nine dessert suggestions are presented, in addition to breakfast and meat accompaniments. Recipes and photographs are given for a "peachy" entrée and two desserts.

Freezing Prepared Foods. Most—but not all—prepared and precooked main dishes, cooked vegetables, baked products, and fruit desserts retained over-all eating quality after six months' storage at 0°F., in a recent U.S.D.A. study. The preparation, packaging, freezing and storage, and thawing and reheating procedures are described; palatability scores are tabulated and individually discussed; and the formulas for the foods studied are given. Because each food presented an individual problem, further studies are needed to: (a) develop formulas suitable for freezing, (b) study packaging requirements and storage life, and (c) develop improved thawing and reheating methods.

COLLEGE AND UNIVERSITY BUSINESS

Vol. 16, February, 1954

* Organization, inspection and buying for multiple unit operation.—R. E. Ohlzen.—p. 49.

School Food Purchasing. Reorganization of food purchasing by the Chicago bureau of lunchrooms has effected: (a) an annual cost reduction of more than $100,000; (b) quality control by continuous U.S.D.A. inspection; (c) portion control through the use of prefabricated meats; (d) availability of sixty days' supply at all times; (e) faster service to the using department of controlled quality foods at greatly reduced costs; and (f) improved relations between the purchasing department and suppliers. Steps in the reorganization program are described, the first having been clarification of food specifications through the use of U.S.D.A. grades.

HOSPITALS

Vol. 28, February, 1954

* Need for cost control techniques. B. Elsholz.—p. 117.

Cost Control Techniques. Administrative skills are needed in hospital dietary departments, as shown by a recent survey. Dietitians' replies are reported concerning: use of organizational charts; manhours; standardized recipes; purchasing; centralized vs. decentralized service; tray delivery; between-meal nourishments; pay cafeterias; cold storage units; kitchen-made vs. bought ice cream; and calculation of raw food costs. Two organizational charts and a standardized recipe card are reproduced.

HOTEL MANAGEMENT

Vol. 65, January, 1954

* Audio-visual indoctrination. W. B. Pfeiffer.—p. 49.
* Asphalt tile. H. Lane.—p. 6°.

Audio-Visual Indoctrination of Employees. Personnel turnover is one of the major difficulties in most hotels. Finding a new employee may not be a

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problem, but turning him into a good employee and keeping him are difficult. Today an organization can have its own effective audio-visual indoctrination and training program at a cost ranging from $25 to $350. The basic investment for equipment includes a projection screen, slide projector, and a tape recorder. The versatility of the combination of color slides and sound tape recordings is its most attractive feature. If changes are desired, it is comparatively simple to insert a new slide or make a substitution in the narration. Key factors such as explanation of the organization; introduction to all the department heads; awareness of the basic rules and regulations; the company's benefits; and the opportunities in the business can be clearly and effectively demonstrated in an employee indoctrination slide film.

Asphalt Tile—Installation and Maintenance. Asphalt tile can be successfully installed on any type of subfloor, the only requirement being that the floor should be smooth and solid. It may even be installed on concrete in direct contact with the ground. Asphalt tile is the toughest of the resilient flooring materials, because it resists decay, warping, and alkaline reaction. It is also fire-resistant. In the maintenance of asphalt tile, the only problem is to avoid cleaners or waxes containing gasoline, naphtha, or turpentine. It can be cleaned with almost any kind of soap or detergent but one should be careful to avoid a soapy residue which leaves a dull cast, absorbs dust, and may be slippery. A floor polishing machine equipped with a fine grade of steel wool can dry clean the asphalt tile floor and buff it. Wax is still the agent which brings out the best appearance of asphalt tile. Do not wax the floors by routine but only when they need it; instead, buff them as long as they respond with a polish.

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THE HOTEL MONTHLY

Vol. 62, February, 1954

* Pineapple . . . the ready-to-use food for starters, entrees, salads, and desserts.—p. 52.

Pineapple. Rich color, refreshing flavor, and firm texture make pineapple popular in old and new dishes, according to the chef of a New York hotel. Six of the hotel's recipes show the diversified role this round-the-clock fruit can play. The harvesting and processing of pineapple are briefly described. Canned pineapple is now in good supply and available in all five forms—slices, chunks, tidbits, crushed, and juice.

INSTITUTIONAL FEEDING AND HOUSING

Vol. 2, January, 1954

* The lunchpail's gone.—p. 2.
* A plan for limited space. A. J. Amendola.—p. 11.
* How to take care of kitchen metals.—p. 14.

Industrial Feeding. Discussed in this article is an in-plant feeding operation for 28,000 employees. The object of the operation is to give employees the best quality food at the minimum cost. The average serving cost is 25 cents. The cafeteria employs 160 people and operates round the clock, meals being served five times daily. The menu includes about thirty items in addition to dessert and a selection of twelve sandwiches. Although almost three-quarters of a million dollars is spent on food each year, "this huge feeding operation means more than just the consumption of tons of food and the efficient operation of a cafeteria." It shows a trend in personnel relations today. Alert management realizes that good food service facilities in the plant are a sound investment for improving employee morale.

Using Limited Space. This article tells how a 140-bed hospital uses limited space to advantage. The food service area consists of a ground-floor main kitchen and a serving pantry on the third floor. All food preparation is done in the main kitchen. Food to go to the serving pantry (which serves half of the patients) is transported in hot food trucks. In the pantry it is dispensed from the truck to plates, which are covered and placed on trays in tray trucks. Patients are served directly from the trucks. Dishes from the third floor are washed in the serving pantry. The remainder of the food (both patient and employee) is served directly from the main kitchen, to which dishes are returned for washing. The employee cafeteria (170 employees) has staggered lunch hours. Methods used by this

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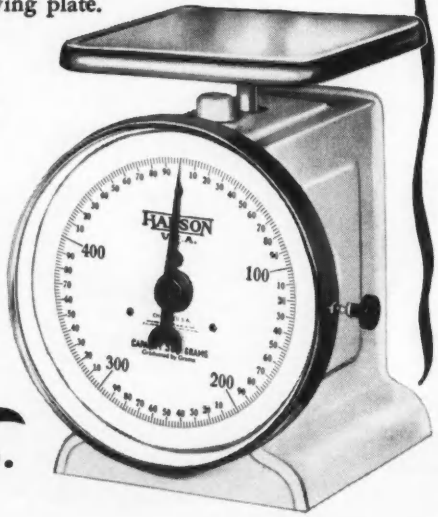

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hospital to save space include: (a) cooking equipment arranged to use a common hood and ventilating system (cook's range area and pastry stove); (b) mixer placed so that it can be used by the salad, bakery, and dessert units; (c) cook's table and bain-marie centrally located between range and food trucks; (d) vegetable preparation area opposite steamer and stock kettles; (e) pot washing area located to receive utensils from both ranges and bakery section; and (f) the dietitian's office placed so that she can check incoming shipments and keep an eye on the food preparation and serving.

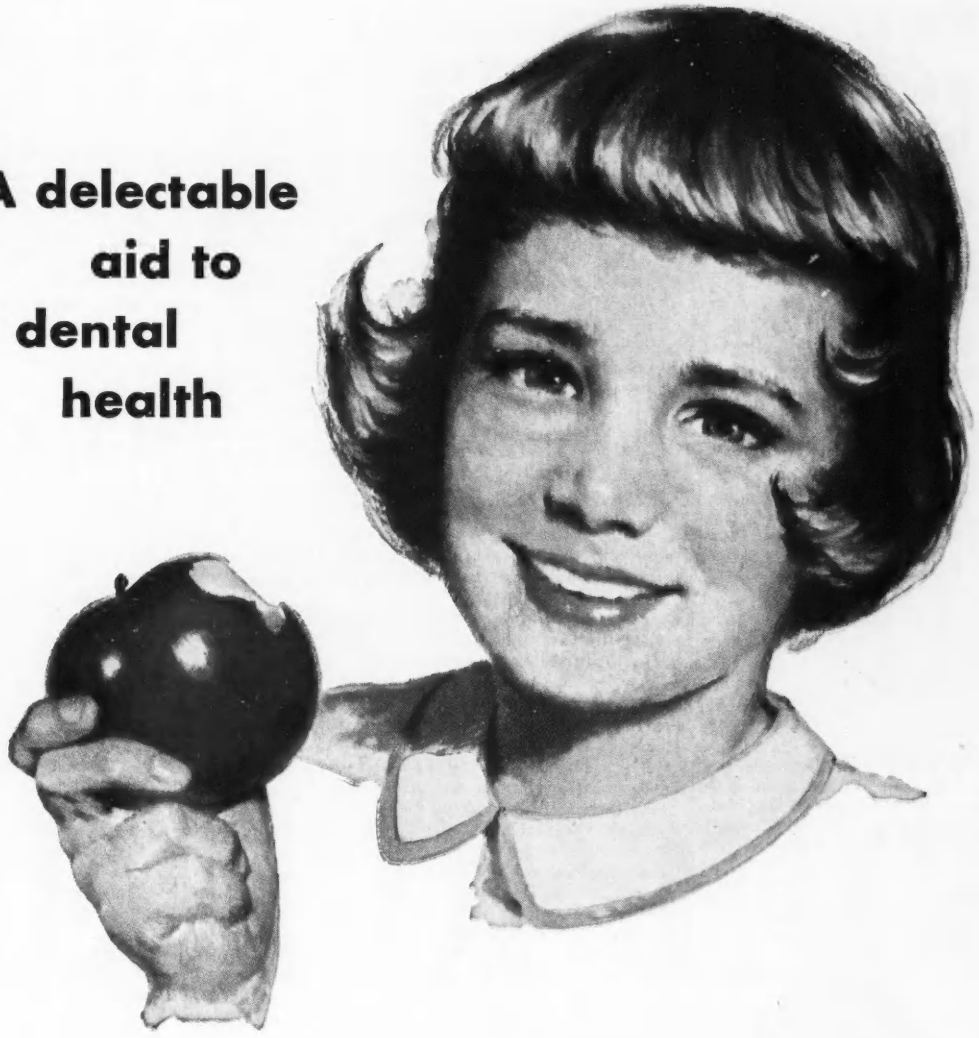
Care of Kitchen Metals. This article deals with how best to clean the various metals found in the kitchen. *Silverware* should be maintained by regular washing and detarnishing. A detarnishing method using the electrolytic principle involves using an aluminum pan, an alkaline detergent, and hot water. Silver forks and spoons should be burnished to remove surface scratches. Utensils of *aluminum and its alloys* should be washed in a mild alkaline solution. The use of steel wool and harsh abrasives should be avoided. Because *tin plate* and *copper* are soft metals and are corroded by harsh alkalies and easily roughened by abrasives, mildly alkaline solutions should be used. Copper may be brightened by soaking or wiping it with a mild acid solution. *Stainless steel* and *nickel alloys* are easily cleaned if food deposits and grease are not allowed to congeal and harden. Moisture trapped under food deposits or salty water allowed to stand in stainless steel containers for long periods can cause the surface to pit. Avoid the use of bleaches and disinfectants containing chlorine. Remove hardened food particles with a fine abrasive. Rub in the direction of polish marks on the steel. Remove discoloration with a 5 per cent solution of warm oxalic or nitric acid. Residual oils from stainless steel coffee urns may be removed by the use of sodium perborate compound. Baking pans require a special washing compound to prevent injury to the surface. Large equipment can best be cleaned by using pressurized steam-detergent equipment. It is more economical, more thorough than hand cleaning, and safer for metal surfaces.

INSTITUTIONS MAGAZINE

Vol. 34, January, 1964

* They're going to school now.—p. 7.
New quantity recipes plum-full of prunes.—p. 28.
Clarify methods of testing soup bases for true flavor.—p. 38.
Merchandising memos. J. Malone.—p. 44.
Window washing can be quick, safe, convenient.—p. 59.
* Pleasant food service planned for college-age patrons. S. M. Hartt.—p. 84.
* Relay system speeds service.—p. 89.
* Good remodeling brings good results.—p. 90.
* Worker costliness inspires ideas for control of output.—p. 93.
* Skilled advice given on cost control of food.—p. 95.
* Selecting griddles and grills. J. R. Myers.—p. 98.
* "Painful truths" told in this analysis of turnover causes. T. Elliott.—p. 104.
* Training secrets told by panel of personnel people.—p. 109.

A delectable aid to dental health



Today's diet, often soft and containing relatively large amounts of carbohydrates, poses a constant threat to teeth and gingivae. A fresh juicy apple after meals is a tasty aid to conservation of dental health. The apple is a succulent cleanser, highly efficacious, convenient and enjoyable. Its firm chewable texture gives needed massage to flabby gums. Its delicate aroma and lively flavor stimulate the salivary glands to copious secretion. These benefits are provided through regular everyday eating of apples.

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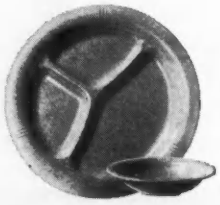

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* Cultivated for quantity.—p. 156.
Vol. 34, February, 1954
* How to select sanitizing equipment. J. R. Myers. —p. 38.
* Tells techniques with part-time employees. S. M. Hartt.—p. 42.

Waitress Training. A new type of short training course for waitresses is now being used by the Southern Illinois University Vocational Technical Institute. The course consists of 16 hr. class work in which waitresses may attend class sessions either while on or off duty. Techniques used for teaching consist of lectures, discussions, demonstrations, use of audio-visual materials, and thought-provoking true-or-false quizzes. At the final class meeting, emphasis is always placed on the value of teamwork. The nominal tuition fee is usually paid by the employer.

Feeding Collegians. Preference surveys are a menu-making tool for the Men's Quadrangle of Purdue University. Food preferences in 1948, when many veterans were enrolled, are compared with 1952 when most students entered directly from high school. While "popular" foods are used most, less popular items are occasionally included for variety. Nutritional accounting is suggested, as insurance that the familiar gripe, "too much starchy food!" is unjustified. Responsibilities of residence hall food managers are described concerning: food selection or purchase; storage and refrigeration; preparation; type of service; food handling standards and sanitation; and waste prevention.

Relay Serving System. In order to feed 1500 insurance company employees in 1 hr. 45 min., thirteen lunch periods were established, one starting every five minutes. This results in a continuous flow of patrons, with seventy-five people coming into the cafeteria at each period. There is a counter set up for each type of lunch to eliminate delay in the serving line. Thus there is free access to hot or cold lunches, and beverages and desserts. Equipment is placed to speed the flow of food to the patrons. Food goes directly from the various preparation centers to serving counters, i.e., the sandwich and salad preparation section is adjacent to the pass-through refrigerator behind the cold food counter.

Good Remodeling. The first consideration in remodeling the kitchen at Loma Linda Hospital in California was the reduction of labor costs. First, cross-traffic was eliminated by the use of straight lines of flow. Food is received at two unloading ramps on the lower level. Here it may be sorted and cleaned in heavy duty sinks near the ramp and elevator by which the foods are sent to the kitchen or storage. The food is prepared in areas only a short distance from and in a straight line with the serving counter. Tray carts are used to deliver food to the floors and soiled dishes to the dish room. "Cooking squares" were formed in the kitchen with the equipment for cooking and preparing hot foods and vegetables and the bakers' and cooks' ovens. The ranges are back to back and the vegetable steamers are at one end. This makes multiple use of equipment possible.

Waitress Efficiency. One employee can make the difference between profit and loss. Labor costs must be thought of in terms of minutes, not hours, as employees cost at least 1 cent a minute and generally 2. Waitresses' stations might be changed to find whether they work better at tables in a straight line with the kitchen or by taking a turn to the left or right. To keep girls at the worse tables, you can either "pat them on the back" or redecorate those places to eliminate "worse" tables. To sell a new dish, serve it the day before to the waitresses, then let them sell it to the customers.

Cost Control. A panel of noted restaurateurs brought out the following points on cost control. In estimating plate or meal cost, one may figure in the shortening, butter, or oil used and cost of all fats bought during a month, then deduct the cost of what is left at the end of the month. If the number of meals, dinners, and plates served during that month are known, divide that number into the cost of fat used. This cost should be included in estimating the charge per plate to the customer.

In arriving at employees' meal cost, a menu may be made especially for the employees giving them a selection in a controlled range of prices. Or, the employees might write out checks for what they eat so that the manager can check costs. Some hotels have established a certain amount for each meal, tell the employees the amount, and give them menus to help them select their food. In Florida, meals are considered as earnings, and the lower the cost you charge against employees' meals, the lower the unemployment compensation you pay.

Griddles and Grills. Whether you should buy a griddle, griddle-top, combination griddle-grill, or just plain grill depends on your needs and preferences and the likes and dislikes of your cook. Questions to ask yourself before buying are listed, as well as what to look for, i.e., type, manufacturer, construction, design, finish, controls, and maintenance. Surface areas in griddles or grills are important in estimating their capacity, but the operating efficiency is primary. The best frying is done on a one-piece polished steel or cast iron plate. Griddles for hot dogs, hamburgers, steaks, and so on, usually have raised edges and grease troughs. A cake griddle does not have a raised edge. The top should be simple without cracks and crevices in which grease and dirt can collect. Those of stainless steel or chrome require a minimum of cleaning effort. Heat control is important. Warnings: don't buy commercial kitchen equipment from someone handling it as a sideline, and don't gamble with second-hand griddles or grills. After each use, the surface should be cleaned with stiff metal spatulas; it should also be wiped daily with damp cloths, giving special attention to switches, thermostats, and connections. The grease receptacles and drip trays should be emptied daily. Keep the temperature lower during periods of

BEST OF PACK

● You can buy with full confidence when you choose Heinz Fruits and Vegetables. Heinz offers one quality only—products selected from the *best* of each year's crop. *And* the Heinz standard of quality exceeds U. S. Government requirements!

Maximum drained weight and full pack assure more portions per tin.

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Apples
Apple Sauce
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Sour Pitted Cherries
Fruit Cocktail
Pineapple Slices
Grapefruit Segments
Sliced Freestone Peaches
Cling Peach Halves
Sliced Cling Peaches
Bartlett Pear Halves
Pineapple Tidbits
Freestone Peach Halves

VEGETABLES

Lima Beans
Cut Green Beans
Whole Green Beans
Sliced Beets
Whole Beets
Spinach
Cream-Style Golden Corn
Diced Carrots
Sliced Carrots
Tomatoes
Whole-Kernel Corn
Sweet Peas
Tomato Paste
Lima Beans

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1553 E. 79th Street, Chicago 19, Illinois
Entitles you to a $3.00 discount on the price of $15.00 per dozen 11 oz. jars of Citro Crest Lemon or Orange flavor Crystals. This offer is for the purpose of introducing you to the convenience of Citro Crest. This coupon must accompany your order.
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Get this terrific offer! It pays you $3 while it is proving the superiority of CITRO-CREST!
● NATURAL FLAVOR from real lemon juice solids.
● CONVENIENCE. Use dry or in solution. Easily stored.
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● ECONOMICAL. 11 oz. jar makes 1 gal. "squeezed strength" or up to 8 gal. of beverage.
● PROFITABLE—lemon drinks at less than 2c per glass.
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FOR ALL LEMON FLAVOR USE
When the recipe calls for lemon juice: use CITRO-CREST! Nothing like it; nothing to compare with it! It's the simple modern way to make beverages, pies, puddings and custards more appetizing and flavor-rich. Available also in LIME, LEMON-LIME, AND ORANGE.
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DON'T DELAY-USE COUPON TODAY
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little use. There should be weekly use of pumice or griddle stones over the surface, rubbing with the grain while the fry surface is still warm. Steel wool should be avoided because of the danger of getting it into the food and scratching the fry surface.

Why Employee Turnover? Personnel management is far behind other phases of the development in the restaurant industry. A turnover rate of 100 to 300 per cent a year—the highest of almost any industry—is proof of this fact. Every new employee costs at least $100, and scientific management to keep this cost to a minimum is essential. Management has certain responsibilities in building a stable work force, two of which are planning and good organization. Planning, although a management responsibility, depends for execution on employees, who must understand reasons. Planning is aided by encouraging supervisors and employees to make suggestions. Employees today expect as their right to belong to a group with a well defined organizational structure, where they are not responsible to more than one person and their duties are clearly defined.

Training Employees. In training, individual differences among employees must be recognized—ability to follow instructions, attitude, and ability to understand what is expected of them. A new employee, if he is to learn his work well, needs motivation such as higher earnings when he becomes proficient, more interesting work, or greater responsibilities. Qualifications of instructors are also listed, and the three steps in training are enumerated as: (a) Tell the worker how the job is done. (b) Demonstrate the job. (c) Have the worker do the job.

Green Beans. Blue Lake green beans, developed to survive the canning process with color and flavor intact, are recommended for quantity steam table use. The growing conditions and processing methods are described. There are five major types of packs: whole, whole vertical, French style, cut, and short cut. Steps in making a green-bean-egg-and-tomato salad are photographed and described.

Dishwashing Machines. Classifications of dishwashing machines include the single- and multiple-tank spray type and the immersion sink type. This article, the first of three, deals with the multiple-tank type. Points to look for when buying this machine, as well as a general description of all types, are given. A method of figuring the dishwashing load of an institution is presented, from which an expert should be asked to determine the need for a multiple-tank machine. Adequate, efficient machines can eliminate service bottlenecks, excess overhead, unnecessary breakage, and unsanitary dishes. The National Sanitation Foundation's standards for dishwashing and sanitizing equipment are noted.

Student Workers. Student supervisors, job descriptions, and careful hiring can improve the student labor situation—which many college food managers find an irksome necessity. A sample job description is presented, and information to appear on applications for work is suggested.

THE MODERN HOSPITAL

Vol. 82, February, 1954

* Centralized tray service. O. R. Scheile.—p. 110.
* Cost control technics. M. M. Harrington.—p. 116.

Navy Hospital Service. Thermal pack equipment has brought completely centralized service to the U. S. Naval Hospital, Corona, California. All trays are assembled on one line, the shape of the tray card telling the worker whether the diet is normal or modified. The details of the process and its advantages are described. While the exact change in food costs is unknown, evidence indicates a saving of at least 10 per cent.

Cost Control Techniques. Cost control, the author says, begins with a master menu. The cafeteria menu should be planned to use foods from the master menu as far as possible, and therapeutic diets can be made up as modifications of the master or house menu. Suggestions for cost control are given regarding forms, records, portion control, charge slips for non-meal orders, and supervision of storage and refrigeration areas. A sample master menu of entrées for private and semi-private patients is shown.

NEWS BULLETIN OF THE NATIONAL RESTAURANT ASSOCIATION

Vol. 35, January, 1954

* How to lower your overhead . . . and raise your profits. F. W. Novak.—Supplement.

Technical Bulletin No. 121, February, 1954

* Pies—how to make, bake, fill, freeze and serve. G. T. Carlin, L. A. Allsen, J. A. Becker, P. P. Logan, and J. Ruffley, Jr.

Trim Overhead for More Profit. Restaurateurs all over the U. S. suggest ways to cut overhead in this article, the last of three based on ideas from a recent contest. "Squeezing" value from the rent, for instance is accomplished better by using idle space for private groups than by spending time, labor, and money to take in a few dollars after midnight. Other problems, with a variety of suggestions for solution, are: lighting; water waste; breakage; linens, including uniforms; equipment; menus; and miscellaneous items, ranging from "portion control" of cleaning materials to cumbersome ashtrays which discourage would-be "souvenir hunters."

Pies. Information on flour, shortening, and supplementary pie crust ingredients introduces this bulletin. Methods of mixing and rolling dough are described, and seven formulas are given for doughs of varying richness. Filling for fruit pies comes next; i.e., how much fruit, how much juice, and how to thicken. Several thickening agents and ways to use them are suggested. Formulas for a regular and a cooked stabilized meringue are given, with answers to meringue problems, such as toughness, bleeding, and weeping. A few words on frozen pies are included. Apple pie—the universal favorite—then takes the

SUSTAGEN

a completely new approach to tube feeding

Now it is possible to give patients who cannot or should not take food by mouth the *full nutritional support* necessary to promote recovery and hasten convalescence.

WITHOUT COMPLICATING SIDE EFFECTS

The problem of diarrhea, cramps and nausea, so long associated with tube feeding, is practically eliminated by Sustagen.

WITHOUT DISCOMFORT TO THE PATIENT

Mead's Tube Feeding Set provides new and unequalled ease of administration. The smooth, slender plastic tubing, about half the size of the smallest rubber tube, is easily inserted and swallowed almost without sensation.

THERAPEUTIC NUTRITION IN THERAPEUTIC AMOUNTS

Sustagen more than meets all nutritional needs even in periods of physiologic stress such as those which accompany serious illness and injury. Sustagen meets or exceeds the therapeutic recommendations of the Committee on Therapeutic Nutrition, Food and Nutrition Board, National Research Council.

A 24 hour feeding of 900 Gm. supplies:

Calories	3500
Protein	210 Gm.
Fat	30 Gm.
Carbohydrate	600 Gm.

Vitamins and Minerals

Vitamin A	5000 units
Vitamin D	500 units
Ascorbic acid	300 mg.
Thiamine hydrochloride	10 mg.
Riboflavin	10 mg.
Niacinamide	100 mg.
Calcium pantothenate	40 mg.
Pyridoxine hydrochloride	5 mg.
Choline bitartrate	500 mg.
Folic acid	2.5 mg.
Vitamin B_{12} (crystalline)	4 mcg.
Iron	15 mg.
Calcium	6.3 Gm.
Phosphorus	4.5 Gm.
Sodium	1.9 Gm.
Potassium	7 Gm.

For detailed information, write for the booklet, "How to Use Sustagen."

IDEAL ALSO FOR ORAL USE

Makes a delicious and nutritious "food drink" for patients requiring a restricted or liquid diet. 3 oz. of Sustagen and 5 oz. of water makes a glassful supplying 330 calories and 20 Gm. protein.

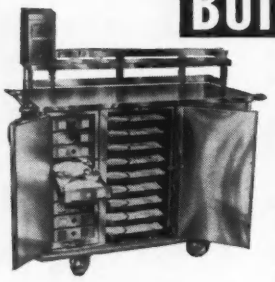
SUSTAGEN a complete nutriment for tube feeding

MEAD JOHNSON & COMPANY • EVANSVILLE, INDIANA, U.S.A. MEAD

You don't have to do this to serve *TEMPERATURE-RIGHT* meals

Meals-on-Wheels Is

BUILT FOR THE JOB



Model 18-D-1 Hot-'N'-Cold Cart. Stainless steel; 61" long; 27" wide; counter 43" high; service shelf 6½" above counter provides for 3 hot or cold beverage containers. Cart takes trays 14"x18" up to 16"x22".

Meals-On-Wheels . . . the *only* central tray service that separates hot and cold foods logically . . . preserves the crispy coldness of *cold foods* — the piping hot goodness of *hot foods.*

The tray, cold foods and all accessories are carried *logically* in the cold compartment. Only the few foods meant to be hot are placed in the electric oven.

Don't let time and distance rob perfection from well-prepared meals. Let us show you how Meals-On-Wheels effectively bridges the gap between kitchen and patient. It's *built for the job.*

WRITE FOR INFORMATION TO → *Meals-on-Wheels* TRADE MARK REG. CRIMSCO INC.

1734 OAK—KANSAS CITY, MO.

Simplify Service
Eliminate Errors
with
AATELL & JONES
DIET CARDS

- HOLIDAY ITEMS
- PRINTED NAPKINS
- TRAY COVERS

Trays are easy to identify with these convenient 2¼" x 1¾" Diet Cards. Ten standard diet subjects available, each on a different colored sturdy stock. Space allowed for patient's name, room and special notes. Write for samples and prices.

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NEW
flavor lift for
LOW-SODIUM
DIETS

Adolph's
SALT SUBSTITUTE
Low sodium foods can now have all the tang of salt seasoning. Adolph's, only product containing MONO POTASSIUM GLUTAMATE, flavors—tastes—sprinkles like salt.

MAKES ALL MEAT
MORE TENDER
Regardless of cut or grade, Adolph's guarantees tenderness, less shrinkage—cooking time, and improves flavor. Reduce meat budget by changing cooking methods of less expensive cuts.

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ADOLPH'S FOOD PRODUCTS, L.A. 46, Calif.

spotlight in the next section. Frozen and canned apples are considered, and a filling formula concludes the apple story. The remainder of the bulletin contains sixteen contributed quantity recipes for pies and fillings.

PERSONNEL JOURNAL

Vol. 32, February, 1954

* How to correct workers. E. P. Johnson.—p. 341.

Correcting Workers. A pattern for a corrective interview is presented in outline form. The main headings, under which numerous sub-points are listed, are: physical setup; timing; preparation; interviewer's attitude; the interview itself; and follow-up. In using the outline to teach supervisors, it is recommended that all items be discussed.

WHAT'S NEW IN HOME ECONOMICS

Vol. 18, February, 1954

* Why girls do take home economics. E. Howe.—p. 52.

Vol. 18, March, 1954

* Deep-fat frying on the march. Fryers for frying.—p. 48. Fats for frying.—p. 50.

Why They Take "Home Ec." Five factors, according to a teachers' questionnaire, account for nearly half the reasons high school girls study home economics: (a) administrative and counseling approval; (b) modern equipment and laboratories; (c) interesting, productive courses; (d) cooperative teacher-parent-student planning; and (e) good teaching. Other reasons include student interest in homemaking and the fact that classes are coeducational. Lack of intellectual prestige is the principal reason girls do not take home conomics; some schools consider the classes a dumping ground for those of low intelligence. Other reasons are lack of glamor or publicity, and college entrance requirements permitting no time to elect home economics.

Deep Fryers. Deep-fat frying equipment is available in three types: automatic, top-of-the-range, and deep-well. Each has multiple uses. Information on the general care and use of each type is given, as well as the proper amounts of fat to use. Popular brands of fryers are tabulated with recommended temperatures for frying various foods.

Fats for Deep Frying. Lard, hydrogenated vegetable shortening, and vegetable oils are used in deep-frying. To be suitable for this purpose, a fat must have a bland flavor, be stable when heated to high enough temperatures for frying, and be reusable a number of times if given proper care. Changes in fats during frying are due to the action of heat, the moisture exuded by the product fried, and contact with the oxygen in the air. As fats break down, their smoking point is lowered. Deep fat frying is limited to foods which can be cooked in a comparatively short time and immersed in deep fat. A list of these foods is included. Care of fats is discussed, and a table gives recommended frying temperatures of seven brands of fats for various foods.

Meat...

and Nutrition During the Anabolic Phase of Postsurgical Convalescence

A large body of evidence shows that supranormal nutrition, especially protein nutrition, aids the patient during the anabolic phase of illness following surgery. With resumption of anabolic response to oral feeding, "what many . . . patients need most is generous intake of highest quality meat, suitably supplemented and appetizingly served."*

Illness of long standing, or injury usually results in dramatic depletion of tissue proteins before surgery. Blood loss during operative procedures increases the depletion. If before surgery the "labile protein store" has not already been depleted, the catabolic response to surgical trauma usually effects such depletion. However, even with heroic feeding measures during the catabolic phase of illness following surgery, replenishment of plasma as well as other tissue proteins presents difficulty. Therefore, for minimizing the hazards going with tissue protein deficiencies, and for shortening the time of convalescence, supranormal feeding becomes mandatory during the anabolic phase in order to provide adequate nutrition for the critically depleted patient.

Because of its outstanding dietetic and nutritional values, meat is dually qualified in the supranormal feeding of the postsurgical patient. Its appetizing flavor induces eating in anorexia and promotes the digestive process. It is easily and virtually completely digested. Its high protein content, of high biologic value, goes far towards satisfying the supranormal essential amino acid needs. Its valuable amounts of B vitamins, iron, phosphorus, potassium, and other essential minerals also prove valuable aids during the period when considerably increased amounts of these nutrients are required.

*Rhoads, J. E.: Supranormal Dietary Requirements of Acutely Ill Patients, J. Am. Dietet. A. *29*:897 (Sept.) 1953.

General Reference: Cuthbertson, D. P.: Nutrition, in Annual Review of Medicine, Stanford, California, Annual Reviews, Inc., vol. 4, 1953, p. 135.

The Seal of Acceptance denotes that the nutritional statements made in this advertisement are acceptable to the Council on Foods and Nutrition of the American Medical Association.

ACCEPTED COUNCIL ON FOODS AND NUTRITION AMERICAN MEDICAL ASSOCIATION

American Meat Institute

Main Office, Chicago...Members Throughout the United States

News Notes

RECENT A.D.A. APPOINTMENTS

The following appointments have been made since the more complete listing of A.D.A. Board and Committees was published in the January 1954 issue of the JOURNAL.

Delegate-at-Large
(to replace Fern Gleiser, who resigned in this capacity)

MANIZA MOORE
Dietetic Representative
VA Area Medical Office
Atlanta, Georgia

Committee to Study the Auxiliary Worker

LOUISE MOJONNIER, Head
Department of Home Economics
Illinois Institute of Technology
Chicago, Illinois

Joint Committee of A.D.A.—Mental Division, American Psychiatric Association

CLARICE D. GULLICKSON, *Chairman*
Dietetic Specialist
Veterans Administration
Washington, D. C.

DORIS BUTLER SUTTON
St. Elizabeth's Hospital
Washington, D. C.

FRANCES E. GIBSON, Head Dietitian
Spring Grove State Hospital
Catonsville, Maryland

Committee on History of A.D.A.

KATHERINE MITCHELL JOHNSON
P. O. Box 697
Vancouver, Washington

Representative on American Board of Nutrition

DR. ERCEL S. EPPRIGHT, Head
Department of Food and Nutrition
Iowa State College
Ames, Iowa

U.S.D.A. Reorganization. Work formerly done by the Bureau of Human Nutrition and Home Economics of the Department of Agriculture is now being conducted by two branches of the Agricultural Research Service: the Human Nutrition Research Branch and the Home Economics Research Branch. Dr. Hazel K. Stiebeling is Director of Human Nutrition and Home Economics Research. Chiefs of the branches are: Dr. Callie Mae Coons for human nutrition and Dr. Ruth O'Brien for home economics.

Food and Nutrition Board News. The Food and Nutrition Board of the National Research Council has named a committee to develop a statement of general principles and other factors for consideration in formulating a policy on use of artificial sweeteners in foods. Such a statement, if approved by the Board, will be transmitted to C. W. Crawford, Commissioner, Food and Drug Administration, at whose request the committee was appointed.

The role of such products will be evaluated in the light of the Food Protection Committee's basic principles and with due regard for the Board's concept of sound nutritional practice. The committee will consider: the food and chemical industries' experience in public distribution and acceptability of artificial sweeteners; their relative utility and effectiveness in various dietary patterns; and the effects on the nutritional and general public welfare in view of methods of retail marketing and advertising, and need for medical supervision. The possible need for definitions and standards of identity under the federal Food, Drug, and Cosmetic Act will also be deliberated.

Chairman of the committee is Dr. W. H. Griffith, University of California Medical Center, Los Angeles.

Symposium on Nutritional Evaluation. Methods for evaluating nutritional adequacy and status were the subject of a symposium held in Chicago in February. The program was keyed to methods for evaluating: (a) protein, vitamin, and mineral adequacy, respectively; (b) military rations by use of test animals; and (c) nutritional status of populations. A round table discussion on body composition in relation to metabolic regulations and activities concluded the sessions.

Participants in the sessions included: Dr. Charles Glen King, Scientific Director, The Nutrition Foundation, Inc.; Dr. H. H. Mitchell, University of Illinois; Dr. Paul Cannon, University of Chicago; Dr. Otto A. Bessey, University of Texas; Dr. C. A. Elvehjem, University of Wisconsin; Dr. W. H. Sebrell, Jr., National Institutes of Health; Dr. Norman Jolliffe, New York City Department of Health; Dr. Josef Brožek, University of Minnesota; Dr. John B. Youmans, Vanderbilt University; and other nutritionists and medical scientists from the armed forces and research institutions in the U. S. and Canada.

The symposium was conducted jointly by the Quartermaster Food and Container Institute for the Armed Forces and the Medical Nutrition Laboratory, Office of the Surgeon General, and was sponsored by the National Research Council's Advisory Board on Quartermaster Research and Development.

WHO Publication. More than eighty zoonoses (diseases transmitted to man by animals) are cited in *Advances in the Control of Zoonoses*, a new monograph of the World Health Organi-

SPECIAL SUMMER WORKSHOPS AND COURSES

University of Alabama, Tuscaloosa
SUBJECT: *Food Cost Control*
DATES: June 7–26
CREDIT: 3 semester hr. (optional)
DESCRIPTION: Will cover significance of cost control, recipe standardization, portion control, daily food cost control, storeroom records, equipment records, labor costs, cumulative records, and setting up a cost control system. Planned for dietitians, school lunch supervisors, food service directors, and restaurant managers.

Virginia Polytechnic Institute, Blacksburg
SUBJECT: *Human Nutrition*
DATES: June 28–July 17
CREDIT: 4 hr.
DESCRIPTION: Designed to further the training of professional people, specifically those engaged in work with human nutrition, as teachers, extension workers, research workers, consultants, nutritionists with industry, and supervisors of homemaking programs. Will consider recent findings in research and their implications for human nutrition. Ways and means of interpreting these findings into action will be considered.

Massachusetts Institute of Technology, Cambridge
SUBJECT: *Food Technology*
DATES: July 12–30
DESCRIPTION: Two weeks' study of fundamental topics, such as: food chemistry and nutrition; effects of microorganisms on foods and food products; control of chemical changes in foods; flavor and food acceptance; unit operations in food engineering; equipment used in food processing; new analytical tools and techniques; and baking technology. Final week, intensive study by four individual groups, with specialized work in: sanitation, nutrition, flavor acceptance, and radiation sterilization.

Florida State University, Tallahassee
SUBJECT: *Institution Plant Layout and Equipment*
DATES: June 14–July 5
CREDIT: 2 hr.
DESCRIPTION: An analysis of factors which determine space allotment, production and service unit relationships, layout trends as they are affected by food marketing processes and trends.
SUBJECT: *Marketing*
DATES: July 6–23
CREDIT: 3 hr.
DESCRIPTION: Analysis of the growth of marketing, grading of food, and recent trends in merchandising of food.

TWO GREAT NAMES...

HOTEL STATLER . . . IN LOS ANGELES

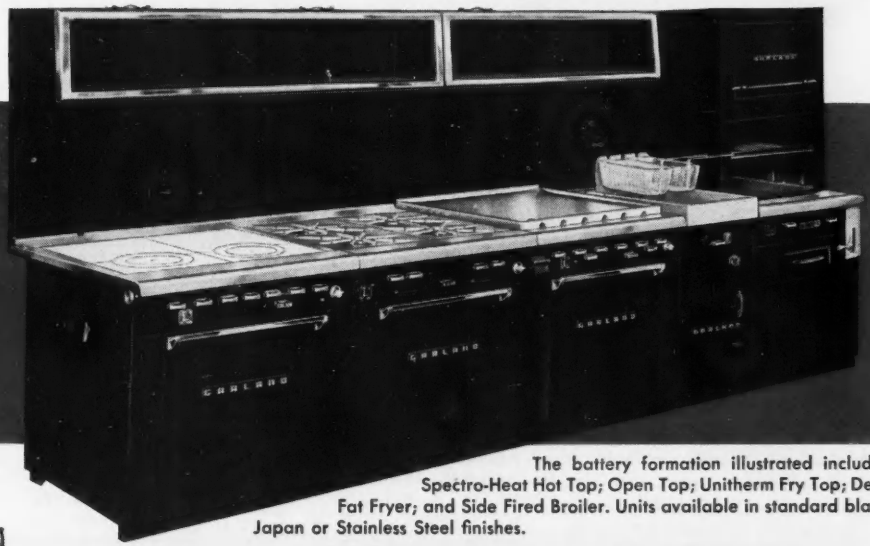
Equipped with **GARLAND...**

THE GREATEST NAME IN COMMERCIAL COOKING!

GARLAND CHOSEN BY NEWEST HOTEL OF FAMOUS STATLER CHAIN!

Where quality is the prime requisite of a volume cooking operation, Garland fits the bill . . . perfectly! That's one of the reasons why Garland is used in more leading restaurants, hotels, clubs, schools, and institutions than any other make! Garland's dependability, economy, and flexibility are unmatched! And it's fired by gas, the ideal fuel. See your food service equipment dealer . . . get the Garland story!

Resident chef, Francis Mendicino, says: "We cook about 2,000 meals a day. When it comes to economy, flexibility, and ease of handling, nothing can touch Garland and gas!"



The battery formation illustrated includes: Spectro-Heat Hot Top; Open Top; Unitherm Fry Top; Deep Fat Fryer; and Side Fired Broiler. Units available in standard black-Japan or Stainless Steel finishes.

45 TWENTY-NINE

Look for the 45-29 Club pin . . . it's the mark of an expert!

GARLAND

DM PRODUCTS

Heavy Duty Ranges • Restaurant Ranges • Broiler-Roasters • Deep Fat Fryers
Broiler-Griddles • Roasting Ovens • Griddles • Counter Griddles • Dinette Ranges

PRODUCTS OF DETROIT-MICHIGAN STOVE CO., DETROIT 31, MICHIGAN
IN CANADA: GARLAND-BLODGETT LTD.—1272 Castlefield Ave., Toronto

zation. The experts report that 27 zoonoses are transmitted to man from livestock, 26 by dogs, 14 by cats, and the remainder by different forms of wildlife. This broad category of disease includes bovine tuberculosis, brucellosis, Q-fever, rabies, and leptospirosis. Work in the field is being carried on jointly by WHO and the Food and Agriculture Organization, the first efforts having been started in 1950 when a joint expert committee was formed. In 1952, specialists from twenty countries met in Vienna to consider the problem. It is the hope of these experts that the problem of control of zoonoses may engage the attention of national health administrations to a greater extent. The value of collaboration between veterinarians, physicians, and public health officials is also emphasized. Copies of this publication, No. 19 in the WHO Monograph Series, are available for $3 from the International Documents Service, Columbia University Press, 2960 Broadway, New York 27.

Malaria Control in Afghanistan. Four years of intensive anti-malarial operations of the government of Afghanistan, assisted by WHO and the United Nations International Children's Fund, have resulted in control of the disease among approximately two-thirds of the country's malarious population. Further plans for expansion of the malaria control to cover new areas with a population of about 580,000 during 1954 and 1955 have been made. On completion of this program, WHO expects the entire country to be virtually free of this public health problem.

UNICEF's Asiatic Milk Program. Powdered skim milk, allocated last year by the United Nations International Children's Fund, is benefiting more than two million Asian children and their mothers. More than four-fifths of this milk is going to those stricken by famine, civil strife, floods, or crop failures. The remainder is being used in long-range nutrition programs. Through the middle of February, 43 million of the 100 million lb. allocated in 1953 had been delivered. All but 6 million lb. of this milk was bought from U. S. surplus stocks.

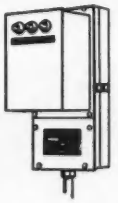
India, with the lowest per capita food supply of any large nation, is receiving special consideration. UNICEF is helping to stockpile a supply of skim milk, rice, and drugs in fourteen Indian states from which emergency needs of mothers and children, brought about by flood and drought, may quickly be met. Other countries receiving UNICEF milk are: Afghanistan, Burma, Cambodia, Ceylon, Hongkong, Indonesia, Japan, Korea, Pakistan, and Singapore. Further allocations are now being considered. When all programs for which the milk is intended get under way, hundreds of thousands more children will benefit.

When sparkling glasses, dishes and silverware introduce a meal, the feeling of fastidious preparation carries over into appreciation of the food itself. The patrons' good will is the reward for washing tableware with DuBois products. Regardless of your particular washing conditions, you are guaranteed crystal-clear utensils with these DuBois products:

4-D-L's—for most effective machine washing
D-LITE—for perfection in hand washing
S-U-D-S—a supersudser for pots and pans

Write for complete data on any DuBois product and DuBois Personally Engineered Service.

For perfect results in any dishwashing machine, contact DuBois today about the new Electronic Control. It maintains uniform solution strength, guarantees cleaner, brighter tableware.



Representatives and Warehouses from Coast to Coast

The DuBOIS Co., Inc.

Cincinnati 3, Ohio Los Angeles 33, Calif.

Plentiful Foods MONTHLY LIST

The following foods, according to the U.S.D.A., are expected to be abundant during April:

Fruits and vegetables

Cabbage	Oranges, fresh and processed
Cranberry sauce	Onions
Grapefruit, fresh and processed	Potatoes
	Raisins

Protein Foods

Beef	Dairy products
Chickens—broilers and fryers	Eggs

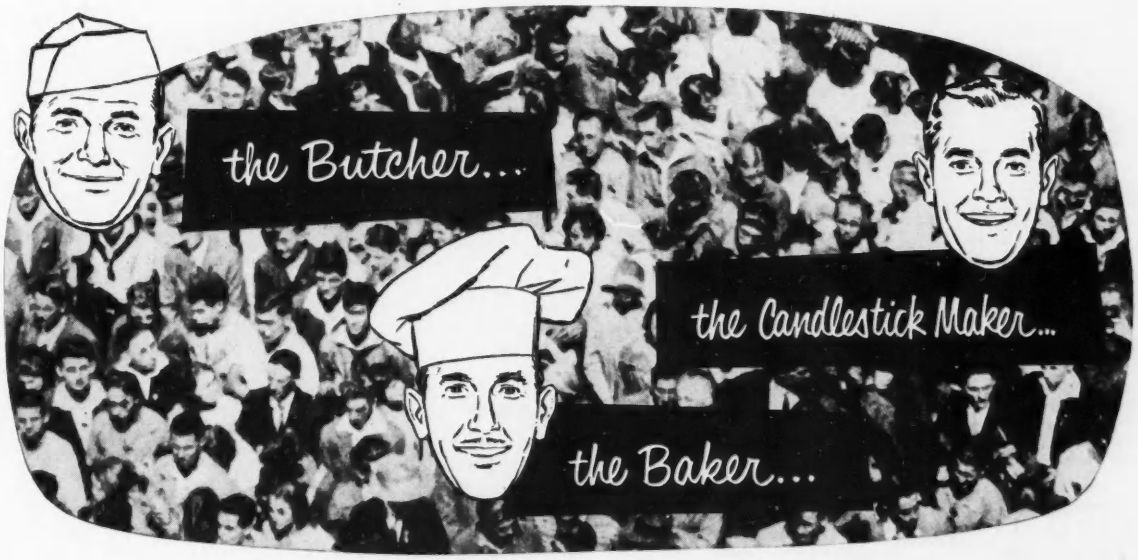
Fats

Peanuts and peanut butter	Table fats
Salad oils	Vegetable shortening

Potatoes, broilers and fryers, and dairy products are listed as "special features" for April.

Beef Consumption Last Year. Beef consumption hit a record high last year when, according to the U.S.D.A.'s Agricultural Marketing Service, the average American ate 75 lb. beef—the largest quantity in fifty-four years of record. Although beef production in 1954 is not expected to be as high, it will still be larger than in previous years. The decline is expected to be temporary, and output in the second half of this year may be equal to that of last year.

Mr. Bugbee in New Post. George Bugbee, Executive Director of the American Hospital Association since 1943, has been appointed President of Health Information Foundation. He succeeds



What does Enriched Bread give him Nutritionally?

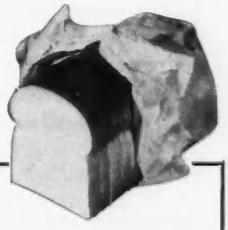
CONSERVATIVE industry estimates indicate that the per capita consumption of bread in the United States is 5 ounces daily. Since the bulk of this output is enriched white bread, the amounts of essential nutrients supplied by this quantity become significant from a standpoint of national health.

Contrary to widespread belief, enriched bread is considerably more than merely a source of caloric food energy. As the table indicates, 5 ounces of enriched bread supplies for a sedentary man, the following substantial proportions of his daily needs for these important nutrients: protein, 17%; thiamine, 28%; riboflavin, 12%; niacin, 26%; iron, 31%; calcium, 13%. Five ounces of bread also provides 16% of the caloric need.

This generous nutrient contribution is made at a cost of but a few cents, a fact which has led bread to be called a bargain in food.

Some twelve years ago, enriched bread came into widespread commercial production as a result of cooperation between industry and health authorities in the aim to improve the nutritional status of the American people. It has made a significant contribution to the improvement of national health and to the reduced incidence of severe and mild deficiency states.

The Seal of Acceptance denotes that the nutritional statements made in this advertisement are acceptable to the Council on Foods and Nutrition of the American Medical Association.



AMERICAN BAKERS ASSOCIATION
20 NORTH WACKER DRIVE • CHICAGO 6, ILLINOIS

NUTRIENTS AND CALORIES CONTRIBUTED BY 5 OUNCES OF ENRICHED BREAD AND THEIR PERCENTAGES OF RECOMMENDED DAILY DIETARY ALLOWANCES*

Nutrients and Calories	Protein	Thiamine	Riboflavin	Niacin	Iron	Calcium†	Calories
Amounts	12. Gm.	0.34 mg.	0.21 mg.	3.1 mg.	3.7 mg.	125 mg.	391
Percentages of Allowances	17%	28%	12%	26%	31%	13%	16%

*Daily dietary allowances recommended by National Research Council for a sedentary man (154 lbs.)
†Estimated average

the late Admiral W. H. P. Blandy, who held office from 1950 until his death in January. Mr. Bugbee was Director of City Hospital, Cleveland, from 1938 to 1942, has been identified in an advisory capacity with numerous medical and health organizations, and is a Fellow of the American College of Hospital Administrators. He will assume his new post on May 1.

Dietitian Appointed Company Director. Margaret C. Dambach, a life member of A.D.A., has been appointed to the Board of Directors of the Belle Vernon Milk Company, Cleveland. She is the first woman director in the company's history as well as one of the first women members to sit on the board of directors of any major Ohio company. She has been dietitian for the company for the past ten years and sales promotion manager for the past three. A graduate of Notre Dame College, Cleveland, Miss Dambach was for six years assistant dietitian at Cleveland City Hospital. As director of cafeteria operations for Belle Vernon, she has received three separate awards by the Ohio State Restaurant Association and was also the recipient last October of two awards presented by the Milk Industry Foundation for outstanding advertising in the dairy industry.

DuBois Foundation Scholarships. Four more state dietetic associations—Rhode Island, Nebraska, Tennessee, and Kentucky—have received dietetic intern scholarships from the T. V. DuBois Foundation, bringing the total of such scholarships to seven in less than one year. A clarification of policy is being mailed to the presidents of the state dietetic associations by the Foundation.

Graduate Opportunities. The spring issue of *Omicron Nu Magazine* carries a list of assistantships, fellowships, and scholarships available for graduate study in 1954–55 and 1955–56. All necessary data have been tabulated and coded, i.e., cash stipend, maximum credit load allowed, clock hours of service required weekly, and so on. To promote wide distribution, reprints a e available and may be requested from the national office of the American Home Economics Association, 1600 Twentieth Street, N.W., Washington 9, D. C., or from Omicron Nu, Home Economics Building, Michigan State College, East Lansing.

Drummond Research Fellowship. The February issue of the *American Journal of Public Health* announces the formation of a Drummond Research Fellowship in England to honor the late Sir Jack Drummond, noted nutritionist who was killed in France a year ago. The fellowship would be administered by a body of university trustees and would be "tenable in any university or appropriate research institution." The goal of the fund has been set at £25,000. Friends of Sir Jack on this side of the Atlantic may share in the fund by sending contributions to the Drummond Memorial Fund, care of Dr. L. A. Maynard, Cornell University, Ithaca, New York.

Meetings. "School Days" is the title of a three-day program to be held in conjunction with the 35th Annual *National Restaurant Convention* and Exposition in Chicago, May 10–14. This marks the first time a special program for school food service operators has been featured at this annual event. The schedule will include closed meetings for school food service people as well as a shop-talk session for cafeteria operators and participation in the general restaurant operators' session on the morning Food Show, May 13.

The *Medical Library Association* will hold its 53rd annual meeting from June 15 to 18 in Washington. The program will include tours of the National Institutes of Health, the National Naval Medical Center, and the Armed Forces Medical Library, in addition to addresses by Verner Clapp, Acting Librarian of Congress, Dr. Detlev Bronk, President of the Rockefeller Institute of Medical Research, and others prominent in the field.

The 31st Annual Conference of the *American Physical Therapy Association* will be held in Los Angeles, June 27 through July 2.

"Today's Challenge to the Home Economist" will be the theme of the *American Home Economics Association's* 45th annual meeting in San Francisco, July 6 to 9. General sessions will feature

SAVES time!
Amazing Electronic Timer
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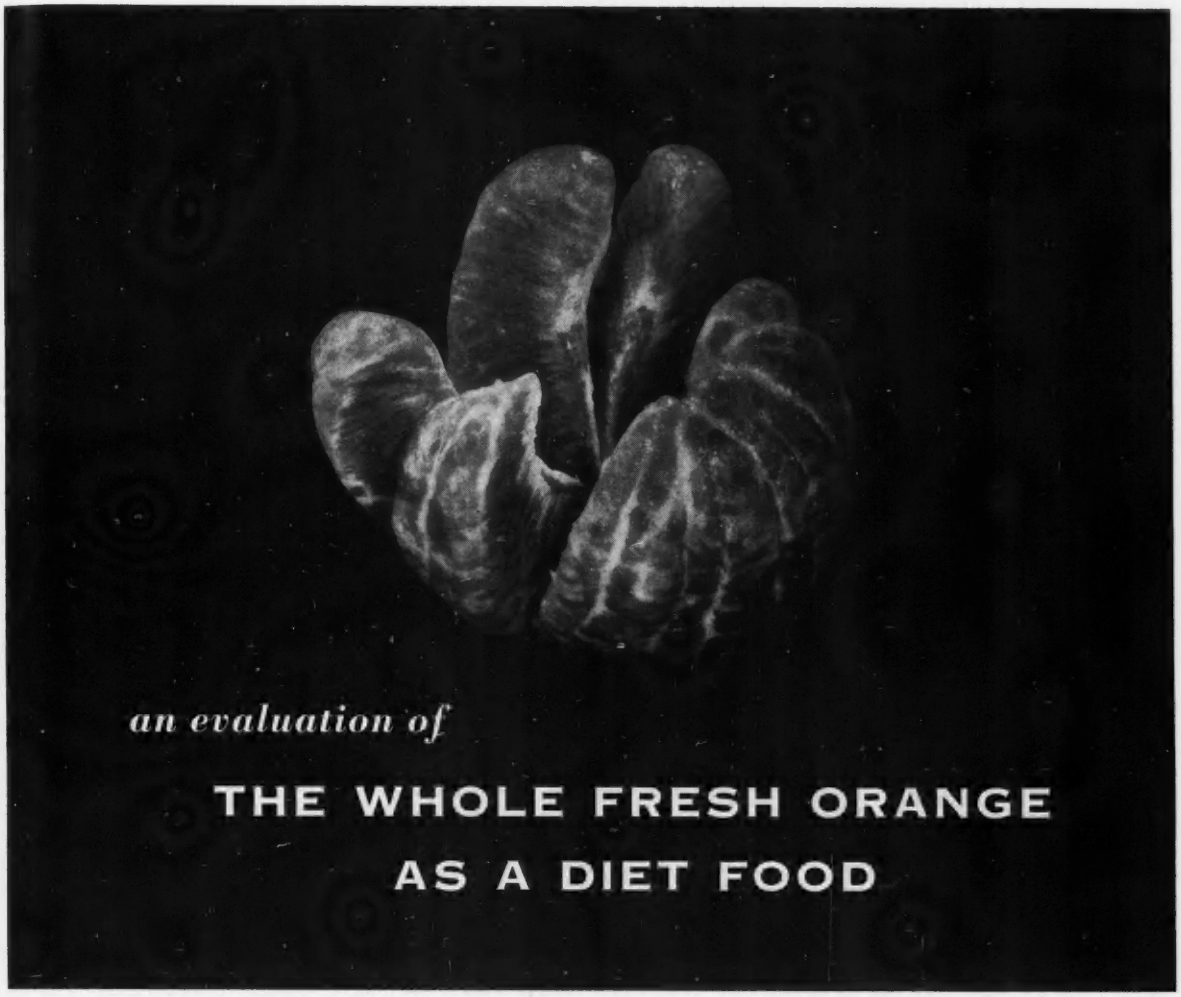
POT and PAN
WASHER
Cleans-Sterilizes
Pie Tins or Garbage Pails
New Model BK
YOU HAVE NEVER seen anything like it! An automatic washer with an amazing electronic timer that provides the proper "wash-drain-rinse-cycle" — no time lost in operation.
NOW your kitchen, too, can machine wash and rinse all pots, baking pans, roasting pans, steam table pans, kettles and utensils — even 80 qt. mixing bowls — mechanically, efficiently, economically . . and the uniform washing operation is performed at an elevated temperature to provide sterilizing as well as cleanliness.
MACHINE WASHES ALL THESE QUICKLY THOROUGHLY - ECONOMICALLY!
Amazingly Compact! Occupies Floor Space of only 3'4" x 5' 2"
Write Today For Free Booklet describing A-F Model BK
THE ALVEY-FERGUSON CO.
Representatives in Principal Cities
81 Disney St. Established 1901 Cincinnati 9, Ohio
Engineers and Manufacturers of A-F Kitchen Conveying Systems, Pot and Pan Washing Machines, Rack Washers



More and more nutritionists are recognizing the values whole fresh oranges can contribute to almost every type of diet.

They are appearing in many diets today because fresh oranges, peeled and eaten out of hand, or sliced, provide significant help in solving two of the basic problems involved in most diets.

1. ***While relatively low in calories, the bulk and natural fruit sugars of fresh oranges help*** **satisfy appetite.**

2. ***Under a restricted food intake, the vitamin and mineral content of foods prescribed becomes more important. The ratio of vitamins and minerals to calories is high in the orange.***

Furthermore, while the value of orange *juice* with its abundant amounts of important vitamin C should certainly not be minimized, a good many of the valuable factors in oranges are found in greater quantity in the meaty parts of the fruit.

These substances in the meat of oranges include carotene (which helps satisfy the vitamin A requirement), bioflavonoids, inositol (a lipotropic B vitamin), and protopectin (which has a useful physiological effect as distinguished from a nutritional value).

Considering these many values of the whole orange, doesn't it seem sound procedure to include fresh oranges in the diets you may recommend?

Sunkist navels are generally regarded as the world's finest eating oranges. Rich in flavor, no seeds, and easy to peel. Sunkist Growers, Los Angeles 54, California.

Sunkist CALIFORNIA-ARIZONA NAVEL ORANGES

education in one world, the importance of research in today's world, and the influence of world economics on standards of living for the world's families.

Third International Congress of Nutrition. Amsterdam will be the site of the Third International Congress of Nutrition, September 13 through 17. Topics to be covered in the sessions include: overnutrition and disease; nutrition and liver disease; parenteral nutrition; nutrition and psyche; and non-nutrient foreign chemical substances in foods (intentional and unintentional additives). Information concerning the Congress is available from Dr. A. C. van der Linden, Executive Secretary, J. D. Meyerplein 3, Amsterdam C, The Netherlands.

"Cookouts." Dietitians planning to work in summer camps may be interested in "Cookouts," a one-page, mimeographed sheet which gives directions for aluminum foil cookery of meat, potatoes, and vegetables, and preparation of hot drinks. The material is taken from the booklet, "Outdoor Cooking with Reynolds Wrap," put out by Reynolds Metals Company, Louisville. "Cookouts" is available on request from the National Park Service, National Capital Parks, U. S. Department of the Interior, Washington 25, D. C.

New Periodical. *Children*, a bimonthly magazine superseding *The Child*, was launched by the U. S. Children's Bureau with the January-February issue. The objective of the magazine is stated by Dr. Martha M. Eliot, Chief of the Bureau, to be "providing a basis for action in behalf of children." Articles in the first issue deal with maternity care, parent education, child study, public health social work, rural child welfare, and volunteer work. News, films, and program developments are discussed in other sections. *Children* is available at $1.25 a year from the Government Printing Office, Washington 25, D. C.

Pamphlet on Medical Research. *Medical Research May Save Your Life!* is the title of a new Public Affairs Committee pamphlet. Written by Gilbert Cant, Medicine Editor of *Time* Magazine, it deals with development of recent research and the need for more research and funds for the conquest of diseases. The pamphlet, No. 201, is available from Public Affairs Committee, Inc., 22 East 38th Street, New York 16, for 25 cents a copy.

Citrus Ice Cream. "Built-in sundae" is the Florida Agricultural Experiment Station's name for a new ice cream: vanilla marbled with sweetened concentrated orange purée. Previously, the high acid content of citrus has prevented its combination with ice cream mixes. The new product, the result of a search for new citrus crop outlets, is made by injecting a fruit purée into a semi-frozen stream of vanilla ice cream. The milk proteins of the ice cream mix are thus protected against "curdling" by too-close contact with the fruit acid. The purée mixture developed by the Florida scientists includes frozen orange concentrate, sugar, water, and a little pectin to stabilize it. The concentrate is added after the other ingredients have been heated together, to prevent changes in the delicate citrus flavor. Purées have also been tested using frozen lemon, lime, and tangerine concentrates. These call for a larger proportion of pectin, but all flavors proved satisfactory in the injection type of ice cream. The popularity already shown for the conventional brick of vanilla ice cream and orange sherbet indicates consumer acceptance of the flavor combination. Thus good response can be expected for the new product.

Freezing Bread. Freezing preserves, but won't restore freshness in bread, according to tests by the American Institute of Baking. It has erroneously been stated that savings from buying stale bread would aid toward the purchase price of a freezer. Tests at the Institute showed that freezing is an ideal way of storing fresh bread as long as a month, but bread held at 0°F. would only be as fresh or as stale when removed as when placed in the freezer.

Safe Poultry Storage. Fresh-killed, freshly drawn, or cooked poultry should be stored, loosely covered, in the refrigerator, preferably at a tempera-

BLODGETT FLEXIBILITY PROVIDES
MENU VARIETY
You can roast, bake and do general oven cookery in a Blodgett oven because of its flexibility and capacity. Each section is separately controlled for proper heat. Foods requiring different temperatures are cooked in different decks at the same time; meat might be roasted in one section at 300°F; baking done in another at 425°F; and general oven cookery in still another at 350°F. A Blodgett is continually producing for you because it can take care of as much as 70% of the cooked food items on your menu.
BAKING
One deck holds twelve 10 in. pie tins or two 18 x 26 bun pans.
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One deck holds as many as 116 casseroles or comparative capacity.
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One deck has capacity for five 25 lb. turkeys or equal capacity.
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Blodgett makes ovens from its "Basic Three" design which provides the units to make 24 models.
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Recommended recipes for feeding baby

1. Human Breast Milk: "the recipe of the most satisfactory food for a baby."

Gunther, M.: Brit. J. Nutrition 6 (No. 2): 215, 1952.

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so similar to the milk of healthy, well-nourished mothers that there is no closer equivalent.

Similac in the baby's stomach forms a soft, fine, fluid curd assuring rapid and easy digestion. Close equivalence (in quantity and quality of nutrients) to breast milk promotes good growth and reduced incidence of complications during the first year of life.

Similac is simple to prepare

Additional information on packaging, prices and ease of preparation may be obtained by writing to

M & R Laboratories, Columbus 16, Ohio

ture as cold as 35° to 38°F., according to the U.S.D.A. The cellophane or film wrap should be removed from unfrozen poultry before placing it, loosely wrapped, in the refrigerator. The bird should be used within two or three days. To hold longer, it may be frozen after wrapping properly to prevent drying. Frozen, ready-to-cook poultry should be stored in a freezer or the freezer compartment of a refrigerator while still hard-frozen. Properly packaged, quick-frozen poultry will hold quality for several months at 0°F. or lower.

Keeping Carrots Fresh. Shelf-life of unpackaged carrots can be prolonged merely by removing the tops, it was found at the U.S.D.A.'s Plant Industry Station. Leaving the tops on causes greater over-all weight loss and shriveling of the roots. Tops should be cut off completely before prepackaging, since even when clipped to 1 in., they are the first part of the vegetable to show darkening, drying, sprouting, or decay.

More carrot news: the scientists found that carrots in various perforated packages and nonperforated Lumarith bags developed no off-flavors or -odors. Normal shelf-life of topped carrots packaged in such moisture-extinguishing bags is about six days at 70°F., at least two weeks at 40°F., and three weeks at 32°F.

Maple Magic. Wooden sap buckets for maple sirup are on the way out, because scientists at the Eastern Regional Research Laboratory, U.S.D.A., have found that the sun's ultra-violet rays can penetrate semi-transparent plastic, bags sterilize the sap, and prevent microbial spoilage which may discolor the sap or make it ropy or sour. Oil-fired evaporators, it was found, are more efficient, handling the sap about 30 per cent faster than wood-fired equipment.

Dr. James S. McLester. On February 7, Dr. James S. McLester died in Birmingham after a short illness. He was noted as an authority on nutrition, his standard text, *Nutrition and Diet in Health and Disease,* having gone through six editions. Dr. McLester was a former President of the American Medical Association, chairman of that Association's Council on Foods and Nutrition for twelve years, and also a member of the Food and Nutrition Board. Shortly before his death he was honored by the A.M.A. by being selected as this year's recipient of the Goldberger Award. During the last war he served as Chairman of the Subcommittee on Nutrition of the National Research Council. He was an honorary member of A.D.A.

Adele Weinstock Hecht. The A.D.A. office has been notified of the recent death of Adele Weinstock Hecht of Hicksville, New York. Mrs. Hecht had been a member of the Association since 1940 and had, before her retirement to become a homemaker, been employed on the staff at the Bronx Hospital, New York City. Mrs. Hecht had also served as an Army dietitian with assignments in the Canal Zone, Atlanta, and Stockton, California.

News of State Associations

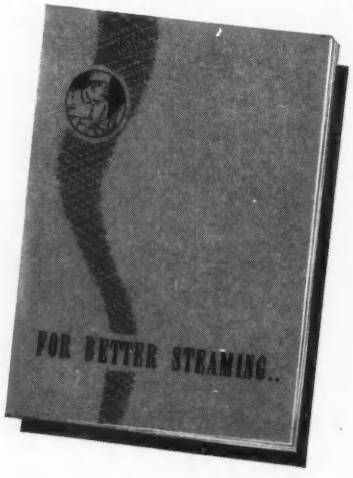
Alabama Dietetic Association. On April 2 and 3, the Alabama Dietetic Association is meeting in Montevallo at the Alabama College for Women. The program will include talks by Cloyd S. Steinmetz and Dr. Hallie Farmer. Mr. Steinmetz, who is Director of Sales Training, Reynolds Metals Company, will talk on "Putting the Person into Personnel." Dr. Farmer, of Alabama College, will discuss "Women's Place in Civil Defense." As representative of A.D.A., Anna dePlanter Bowes will report on national association activities. Guests for the meeting will be the outstanding graduating seniors in foods and nutrition from Alabama College for Women, Alabama Polytechnic Institute, and the University of Alabama.

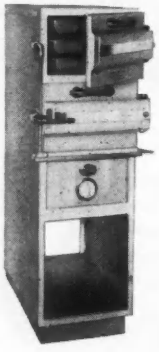
The February meeting of the *Birmingham Dietetic Association* featured a talk by Col. U. N. James of the civil defense organization.

California Dietetic Association. The *Central Valley Section's* Vocational Guidance Committee is working out a career lesson plan for high school use. This is a continuation of a project begun last year. The plan calls for freshmen

This informative Book

-yours for the asking—





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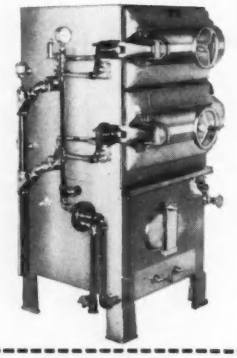
(Junior Size)

STEAM-CHEF
(Heavy Duty)



NAFEM

This 48-page illustrated book gives you authentic information about steam cooking. It has been prepared in cooperation with authorities from the University of Wisconsin, Columbia University and others. It contains charts and tables comparing steam cooking with other food preparation methods, and gives specific recommendations for the most effective use of steam in your kitchen.

Any person responsible for the preparation of meals for 50 or more persons, will profit from a study of this handbook. Use coupon below to obtain your free copy.

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to receive brief instruction from their regular teacher about dietetics, occupational therapy, and physical therapy This introduction would include information on subjects and qualifications, as well as some narration about the work. A team of three from the professions represented would then follow-up the instruction with talks and films. Seniors receive similar instruction, amplified with discussion of salary scales. They are also given a list of colleges.

At the February meeting of the *Los Angeles Section*, Helen Goodrich and Rita Shaylor, both of the Consumer Service Department of Western Growers Association, discussed and demonstrated handling, cutting, purchasing, and new uses of vegetables and melons. Announcement was made of the newly organized lay diabetic society in the city.

Members of the *Sacramento Section* in February saw a demonstration of fixed and mechanical kitchen equipment by Ursula Stanton.

The February program of the *San Diego Section* featured Mary Burton, Home Service Department of the San Diego Gas and Electric Company, who spoke on "Quick Meals and New Methods of Cooking."

District of Columbia Dietetic Association. This year's program of the D. C. Dietetic Association will include four meetings—in November, January, March, and May.

The November meeting featured a talk by Dr. E. Neige Todhunter, Dean, School of Home Economics, University of Alabama, Tuscaloosa. Her topic was "History of Dietetics." In January, capital dietitians heard George Hennigan, Professor of Speech, George Washington University, discuss "Oral Communication." The March meeting was devoted to "Aspects of Food Administration," as presented by Veronica Morrissey, Food Manager, Hogate's Arlington House. In May, a full day's meeting is to be held jointly with the District of Columbia Home Economics Association and the Maryland Home Economics and Dietetic Associations at the National Institutes of Health, Bethesda, Maryland. The program will include a tour of the Institutes.

Illinois Dietetic Association. On March 11 and 12, the annual meeting of the Illinois Dietetic Association was held in Chicago. The program included the following papers and talks:

"Food Cost Control"—Bessie Brooks West, Kansas State College, Manhattan

"Interpersonal Relationship"—Dr. Roy L. Brener, Chief Clinical Psychologist, VA Hospital, Hines, Illinois

"Current Trends in Sodium Restriction"—Dr. James R. Wilson, Secretary, Council on Foods and Nutrition, American Medical Association, Chicago

"Recent Progress in Nutrition and Hardening of the Arteries"—Dr. Jeremiah Stammler, Michael Reese Hospital, Chicago

Panel on "Obesity—A Community Nutrition Problem" with a health educator, a home economics consultant, and a clinic dietitian as participants

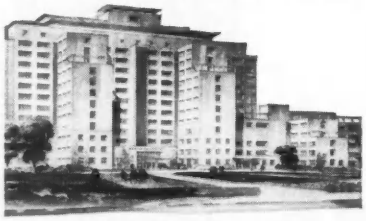
"Developing Better Teaching of Nutrition in the Nursing Education Program"—March E. Swallen, Nursing Education Coordinator, Illinois Department of Education and Registration, Chicago

Grace Bulman, A.D.A. President, attended the meeting as official representative.

Massachusetts Dietetic Association. In February, the Massachusetts Dietetic Association issued its first bulletin. Volume I, No. 1, is a four-page, off-set production, 6 × 9½ in. in size, printed on pink stock. It uses illustrations, both photographic and line drawings, effectively to point up its features, which are kept short and "snappy." The establishment of the DuBois Scholarship in Massachusetts and the part of the Association in the Diabetes Fair in November are featured. Activities of interns in Boston are chronicled, and a bibliography of four references for "recommended reading" is presented.

Michigan Dietetic Association. Members of the *Detroit Dietetic Association* heard Robert Satterwhite, Jam Handy Organization, Detroit, discuss

Choose either plan...

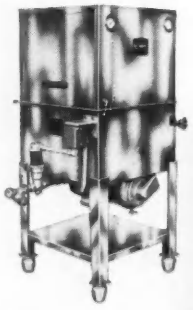


The Hartford Hospital decentralizes. Sixteen Colt Autosan R-16 Dishwashing and Sanitizing Machines handle tableware in 16 separate diet kitchens. In the employee's cafeteria, a larger Autosan handles tableware for 1200 employees.

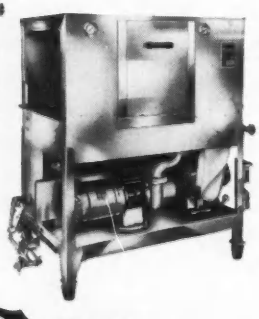
Whether Your Kitchens Are Centralized or Decentralized, You'll Find Colt Autosans Wash and SANITIZE Dishes More Effectively and More Economically

Large hospitals decentralize kitchens to speed service and achieve more flexible diet control.

In smaller hospitals and nursing homes, the large, centralized, single kitchen is still the most practical. Whichever plan you choose, you'll find Colt Autosan Machines will handle your dishwashing problems with more dispatch and more economy than any other. Large or small units, Colt Autosans are designed for maximum capacity, minimum space, and a long and useful life. For complete information, write Colt's Manufacturing Company, Dept. JA-4, Hartford 15, Conn.



COLT AUTOSAN MODEL R-16A
(900 Dishes, 1500 Glasses per Hour)
Rack type for straightaway or corner installation. Also available with automatic timing to insure full period, sanitizing cleanliness.



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The safety-protected chain conveyor with driving lugs picks up and discharges any standard racks. New wash chamber door gives easy access to interior, simplifies cleaning. Especially popular wherever female attendants are employed. Only 27" wide by 42" long, table to table. Like all Colt machines it is designed to outlast any other piece of equipment in the kitchen.

Dishwashing, Sanitizing and Drying Machines, Vegetable Peelers

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INSIDE SCIENCE

White Flour in the U.S.A.—

Enriched* with Vitamins and Iron for Better Nutrition

by Science Writer

This article is one of a series devoted to the enrichment of family white flour, white bread and rolls, corn meal and grits, macaroni products and white rice.

The enrichment of family white flour with thiamine, riboflavin, niacin and iron by American millers is a major success. It has made great contributions to better health in the United States by improving a staple food.

Since the start of the program in 1941 by millers, voluntarily, the evidence is conclusive that enrichment not only has reduced the number of cases of certain dietary diseases but also is promoting the mental and physical vigor and well-being of the U. S. population generally. Because of its demonstrated value, the principle and practice of enrichment have been applied to other foods made from grains: corn meal and grits, white rice, macaroni, spaghetti, noodles, pastina, farina—and, of course, to white bread and rolls.

Doctors and diet experts have long supported white flour enrichment. The Council on Foods and Nutrition of the American Medical Association and the Food and Nutrition Board of the National Research Council are on record as endorsing the practice.

The legislatures of a majority of the States plus Hawaii and Puerto Rico have enacted laws which make mandatory the enrichment of all family white flour, as well as white bread, sold commercially in those areas.

American homemakers, too, favor foods they know to be enriched—a fact demonstrated by surveys. They look for these words on package labels: "Enriched with vitamins and iron for better nutrition."

What Is Enrichment?

It's an axiom in the milling industry that consumers want beautifully fine, white flour. When wheat is milled and processed to get the white flour which the public demands, vitamin and mineral values are unavoidably lost.

Enrichment restores to white flour the following important vitamin and mineral factors: thiamine, riboflavin, niacin and iron. Calcium also may be added as an optional ingredient. The process is simple and inexpensive. A mixture of the vitamins and iron is fed into the flour stream during processing. This insures that the enriching ingredients are spread evenly throughout the flour.

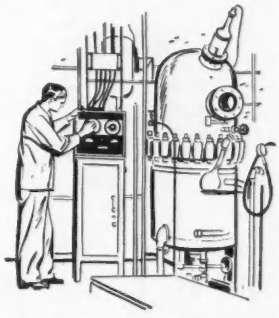
The U. S. Food and Drug Administration has established standards which white flour must meet to be properly labeled enriched. The requirements, in milligrams per pound, are:

	Min.	*Max.*
Thiamine (vitamin B_1)	2.0	2.5
Riboflavin (vitamin B_2)	1.2	1.5
Niacin (another "B" vitamin)	16.0	20.0
Iron	13.0	16.5

(In Canada, too, the same standards have been set for enriched white flour through the amendment of the Food and Drugs Act.)

Vitamins Are Made

The science of chemistry is so advanced these days that many of Nature's complex substances can be "duplicated" in the laboratory. This has happened with many vitamins. First, the chemical composition is learned. Second, the pure substance is isolated. Third, a "duplicate" is made by synthesis. And fourth, the laboratory techniques are extended to large scale operation.



The manufactured "duplicate" is identical chemically and in biological activity with Nature's own product. A vitamin is still a vitamin regardless of its source. So efficient is large scale manufacturing that vitamins are sold at a lower cost than if they were extracted from natural sources.

The Hoffmann-La Roche people make top quality vitamins actually by the tons. To do this they use amazingly complex processes with scientific production controls and the latest equipment which fill buildings each a city block square and many stories high.

Reprints of this article, and all others in this series are available without charge. Please send your request to the Vitamin Division, Hoffmann-La Roche Inc., Nutley 10, New Jersey. In Canada: Hoffmann-La Roche Ltd., 286 St. Paul Street, West; Montreal, Quebec.

The watermills are gone. Today's needs require today's methods. How sensible it is that millers across the nation restore health-giving vitamins and minerals through enrichment.

*Webster's Merriam Collegiate Dictionary includes this definition of "enrich": "to improve (a food) in nutritive value by addition in processing of vitamins and minerals".

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the selling power of color food photography at their meeting in February.

Montana Dietetic Association. Dietitians of Bozeman have written and compiled a "Dietary Handbook for Small Hospitals and Nursing Homes in Montana" to serve as an aid in food service management for cooks or nurses in hospitals without dietitians. It contains information about the normal diet as well as modifications. The handbook, which is approved by the Montana Medical Association, is being published under the direction of the Montana Dietetic Association and the Montana Board of Health, Hospital Association, and Agricultural Experiment Station.

New Jersey Dietetic Association. Through the efforts of the New Jersey Association, a program of graduate work will be offered this fall by the New Jersey College for Women for dietitians interested in earning credits toward a master's degree.

A speaker's bureau has been formed by the New Jersey Association so that information about the profession can be given to students. Letters have been sent to high schools in the state, suggesting that dietitians be given a part on their career day programs.

The five local units—Newark Area, Middle Jersey, Northeast Jersey, Trenton Area, and South Jersey—were organized last fall in New Jersey.

Newark Area dietitians met in February to hear Dr. Kathleen Rhodes, New Jersey College for Women, speak on "Our Responsibilities and Privileges in Some World Food Problems." Home economics students from New Jersey College for Women and St. Elizabeth's College, Convent Station, were guests. Betty Hurlburt Boutsikaris is President of this group.

Ethel Tuman, VA Hospital, Lyons, is president of the *Middle Jersey Dietetic Association*. Asta Low Packard, Dietitian, New Jersey Reformatory for Women, reported on her work in Honolulu and showed films of the Islands at the February meeting.

Two February meetings were held by the *Trenton* group, of which Alta Fitch Yazujian, Mercer Hospital, is President. Recent trends in nutrition were discussed at the first. The second took the form of a conducted tour through a china manufacturing plant.

The *Northeast Jersey Association* in March heard a talk on "Milk and Allergy" by a staff physician of the Barnert Memorial Hospital, Paterson. Phyllis Jenco, St. Joseph's Hospital, Paterson, has been elected President of this group.

Frances Hanold, Du Pont Plant, Deepwater, is President of the *South Jersey Dietetic Association*.

Washington State Dietetic Association. "Going Ahead Together" is the theme for the Washington State Dietetic Association-Washington State Home Economics Association meeting, being held April 9 and 10 in Pullman. Doris T. Odle, Treasurer, A.D.A., is attending as official representative. Members of the Idaho and Oregon Dietetic Associations will be guests of the Washington group.

The program will include the following speeches and papers:

"Planning for Effective Administration"—Margaret Terrell, University of Washington

"What Makes Public Food Service Successful?"—Nelma Saylor, Manager, Pasco Hotel Coffee Shop

"Controlling Portions, People, and Profit"—Lendal H. Kotschevar, Seattle

"Nutrition in Siam"—Dr. H. E. Zion, Director, Student Health Service, Washington State College, Pullman

"Relation of Antibiotics and Vitamin Antagonists in Nutrition"—Dr. James McGinnis, Professor of Poultry Science, Washington State College

"Nutrition in the Acute and Chronically Ill Child"—Dr. Frederick R. Fisher, Pediatrician, Spokane

"Techniques in Presenting TV Programs"—R. C. Norris, Washington State College

"Higher Education for Women"—C. Clement French, President, Washington State College

At the winter meeting of the Lay Society of the Washington State Diabetic Association, eight dietitians participated in the program which was on "Diets for Diabetics." A panel discussed the exchange lists and labels on dietetic foods.

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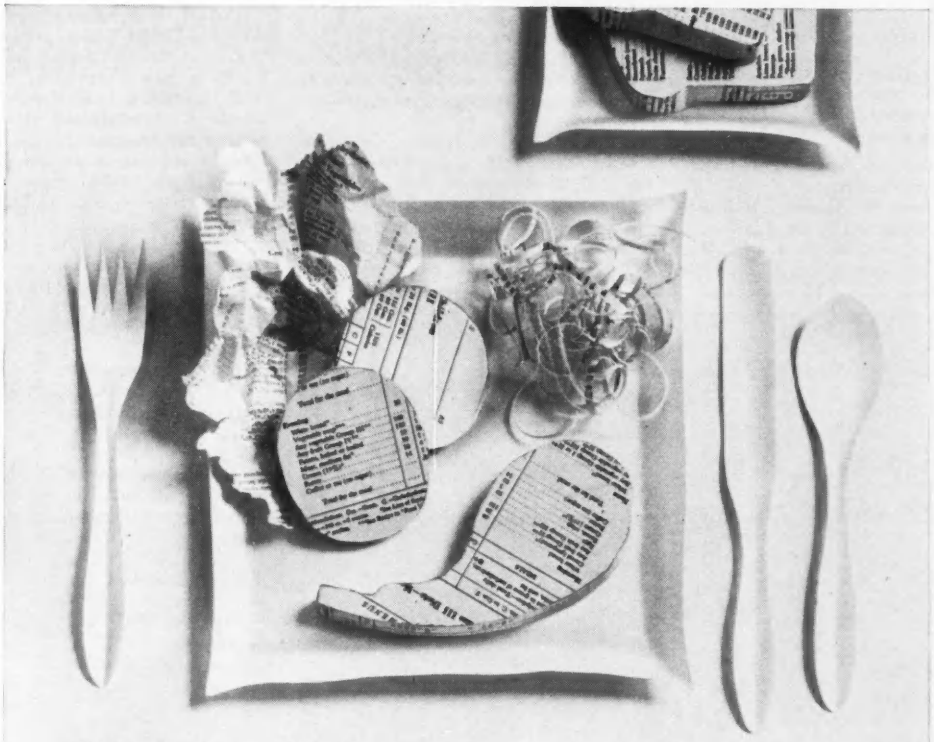

Diets look good on paper

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makes good food and good cooking taste better!

Learn about Ac'cent at first hand . . . visit our exhibit at the A.M.A. meeting.

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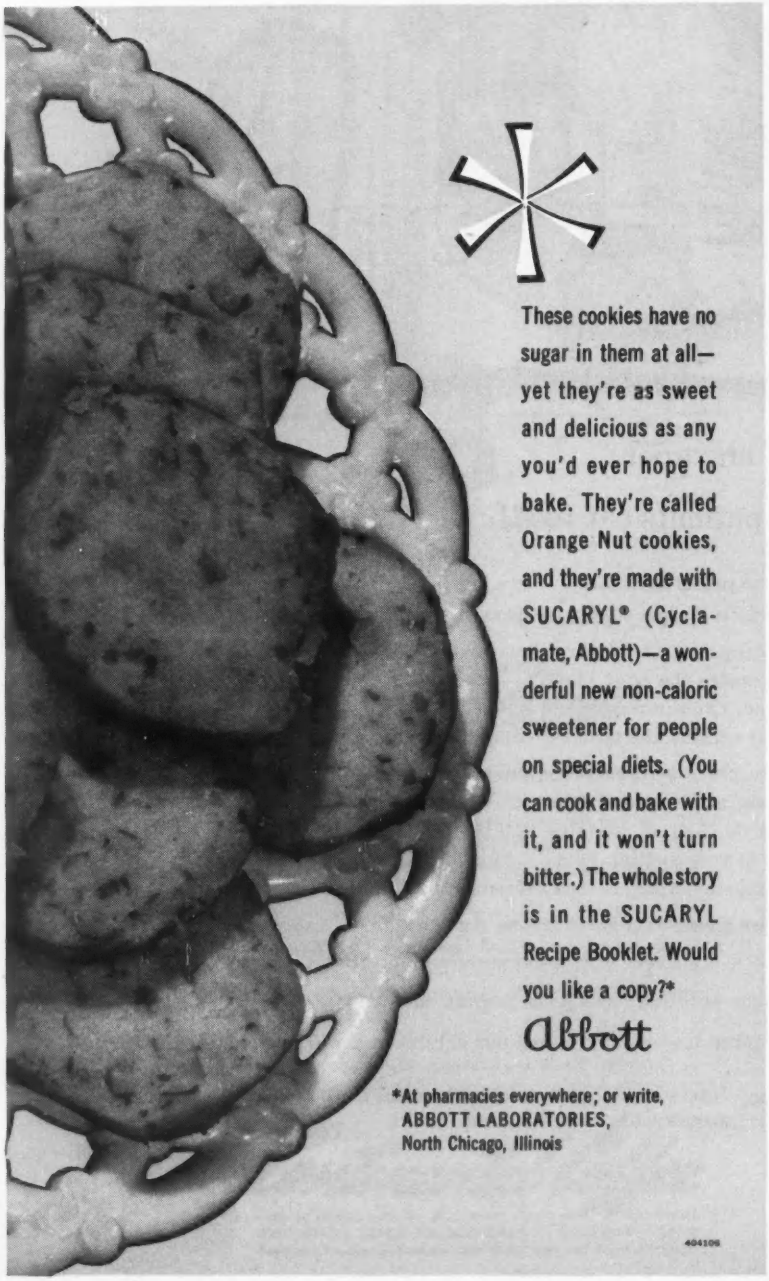
sociation in February heard Allen Z. Zoll, University of Washington School of Business, speak on "Getting Along with People."

Association Activities

State Meetings. The following state dietetic associations will have national representatives attending their meetings this month:

April 1–3—Ruth M. Yakel, Texas Dietetic Association, Dallas
April 2–3—Fern W. Gleiser, Missouri Dietetic Association, Columbia
April 2–3—Anna dePlanter Bowes, Alabama Dietetic Association, Montevallo
April 7–8—Elizabeth Perry, Michigan Dietetic Association, Ann Arbor
April 7–9—Grace Bulman, Georgia Dietetic Association, Atlanta (Southeastern Conference of Hospital Dietitians)
April 8—Mary Reeves, Iowa Dietetic Association, Des Moines
April 9–10—Doris T. Odle, Washington State Dietetic Association, Pullman (Idaho and Oregon Dietetic Associations, guests)
April 9–10—Fern W. Gleiser, Ohio Dietetic Association, Columbus
April 27–28—Elizabeth Perry, Indiana Dietetic Association, Indianapolis
April 28—Jane Hartman, Connecticut Dietetic Association, New Haven
April 28–30—Esther A. Atkinson, Pennsylvania Dietetic Association, Philadelphia
April 28–30—Fern W. Gleiser, New York State Dietetic Association, Albany


These cookies have no sugar in them at all—yet they're as sweet and delicious as any you'd ever hope to bake. They're called Orange Nut cookies, and they're made with SUCARYL® (Cyclamate, Abbott)—a wonderful new non-caloric sweetener for people on special diets. (You can cook and bake with it, and it won't turn bitter.) The whole story is in the SUCARYL Recipe Booklet. Would you like a copy?*
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*At pharmacies everywhere; or write, ABBOTT LABORATORIES, North Chicago, Illinois
404106

A.D.A. Representatives. The 1954 *National Health Forum* presented by the National Health Council met March 24 to 26 in New York City. June Bricker and Henderika J. Rynbergen, members of the National Health Council, represented our Association. The Forum program was focused on the personnel of the nation's health services. A.D.A. is one of the forty-four national member organizations.

Delegate-at-Large. Maniza Moore has been appointed by the A.D.A. Executive Board to serve as Delegate-at-Large from February, 1954 through the Annual Meeting of 1955. Miss Moore will complete the term of Fern Gleiser, who is resigning in the capacity of Delegate-at-Large in view of her forthcoming term as President.

Evaluation Forms. The *Evaluation Form for Dietitians* and the *Evaluation Form for the Dietetic Intern* are now ready for distribution. A description of their uses and purposes is given in the Editorial Section in this issue of the JOURNAL.

The cost of the *Evaluation Forms* are as follows:

1 copy	$ .10
25 copies	2.00
50 copies	3.50

A Manual for Administration of the Evaluation Forms will be sold at 25 cents a copy.

Directors of dietary departments should find the Evaluation Form a helpful tool in staff improvement and development.

Library Committee. The A.D.A. Library Committee met February 23 at the headquarters office.

Nutrition Bibliographies. The "Nutrition Bibliography" has been revised and is now available in eight separate sections or as a complete set from headquarters office. A listing of the sections and prices, as well as other reports, leaflets, and selected bibliographies is found on page 174 of the February issue of the JOURNAL.

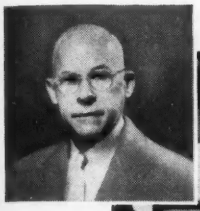
News of Products and Services

Starlac Division of *The Borden Company* has used a unique and stimulating approach in presenting recipes in its new booklet designed to offer teachers provocative approaches to the social studies on the junior high school level. Titled "Food in Fiction," it presents summaries from a group of well known classics in American literature. From the food scenes of such works as *The Song of Hiawatha*, *The House of Seven Gables*, *Tom Sawyer*, *Little Women*, and *Moby Dick*,

for handsome design...

for profitable operation

Wheeler's uses Libbey Crested Heat-Treated Glasses



Iced Tea, No. 606
12 oz.

Water, No. 610
9½ oz.

One look through the big picture windows indicates it. Closer inspection inside, proves it: Wheeler's, Indianapolis, Indiana, is an outstanding food operation. Popular owner William O. Wheeler knows the value of top-grade food, service and equipment.

When it came to glassware Mr. Wheeler demanded, and got the best: Crested Heat-Treated tumblers in Libbey's popular Governor Clinton line. Mr. Wheeler liked the unbeatable Libbey combination of handsome design, easy-to-hold shape, long wearing durability. And, not to be overlooked is the money-saving combination of Heat-Treating and the Libbey "Safedge" guarantee.

A Libbey Heat-Treated glass averages up to 200 servings at a cost per serving of only a fraction of a mill. Every Libbey glass is further guaranteed: "A new glass if the rim of a Libbey 'Safedge' glass ever chips!"

You can bring the same good taste and operating economies to your own beverage service. And for a slight additional cost, you can include the personal touch that your own crest, monogram, or trade mark brings.

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dishes have been chosen and recipes adapted for use in the modern kitchen. Suggestions are made for the use of some materials in the booklet in classes on language arts, homemaking, social studies, and mathematics.

Mead Johnson and Company has introduced "Liquid Sobee," a soya formula for allergic and potentially allergic infants. No carbohydrate need be added. Vitamins A and D are incorporated in the formula, and a new, exclusive processing method retains much of the natural B vitamin content of soybeans and eliminates the "burned" taste of soybean preparations. Feedings are prepared by adding 1 part water to 1 part Liquid Sobee for a formula providing 20 calories per fluid ounce. According to company reports, Liquid Sobee assures a nutritionally uniform formula in that the product does not separate and even distribution of nutrients, unaffected by storage, is assured. Clinical studies on normal and allergic infants indicated good tolerance of the product. Growth curves obtained in infants and experimental animals are comparable to those produced by cow's milk and greater than with ordinary soybean products for infants.

"Masa Harina," a new dehydrated *tortilla* flour, similar to flour mixes, is being manufactured by *Quaker Oats Company*. Distribution is limited at present to the Southwest. Developed by scientists at Armour Research Foundation, Illinois Institute of Technology, working with Mexican scientists, this dehydrated *tortilla* flour has already passed the test of acceptance by Mexicans themselves. For hundreds of years, the making of *tortillas* has been a long and laborious hand process. Dried, whole-kernel corn is steeped overnight in heated limewater; then the swollen kernels are drained and ground to a doughy consistency, called *masa*. The *masa* is then kneaded, rolled, or patted into thin cakes and baked for a few minutes on a hot grill. The *masa*, naturally, is susceptible to the growth of microorganisms and other impurities, and once prepared, can be kept for only a few hours. With the new product, "Masa Harina," which is essentially a dehydrated *masa*, this danger is eliminated, and the mix may be stored for six months or longer. Only the addition of water is necessary to prepare it for baking. The new product was developed at the request of the Bank of Mexico. The new "Masa Harina" may be used for a number of Mexican foods, including tamales, chili, corn chips, *enchiladas*, and *tostadas*. Quaker Oats officials are optimistic that *tortillas* and other Mexican foods made from the "Masa Harina" will become as popular in the U. S. as pizza.

Ground has been broken for *American Can Company's* Research and Development Center in Barrington, Illinois. The new building will contain special laboratories devoted to food chemistry and nutrition, tinplate, coatings, and other specialized types of research. "Hot" and "cold" rooms, capable of simulating climatic conditions from the tropics to the Arctic, will permit storage of test packs of every type of food and nonfood product. The company will also continue its technical service and quality control groups in Maywood, Illinois.

Poultry and Egg National Board has published a home economics lesson plan titled "Golden Treasury of Turkey Cookery." In its nineteen decorative pages are contained tables and information on: selection of turkey; preparation for cooking; basic cooking methods; aluminum foil cookery; summary of cooking methods; cooking turkey giblets; care of uncooked and cooked turkey; nutritional value; and cutting a large bird into parts. This last section includes a diagram of a cut bird and suggested cooking methods for the individual parts.

"The Magic of Egg Solids," an attractive yellow and gray folder, has also been issued by the *Poultry and Egg National Board*. A table gives information on the nutrient content of egg solids. Their use in cakes, doughnuts, noodles, pies, meringues, cookies, ice cream, and candy is discussed.

Calgon, Inc., and Hagan Corporation have announced a new "Speedy-Kit" for making field tests of water hardness sensitive to one grain per gallon (17.1 parts per million). The test may be made in only 1 min. The method employed in using the new kit and contents (two bottles with eyedropper tops and one glass vial) represents a simplification of water test procedures based on Schwarzenbach methods now widely used in the U. S. and elsewhere. The test is expected

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LEGION has the answer in Stainless Steel!

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No breakage • Easy-to-clean
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The Increasing Role of Gelatine in the Sciences

The Sciences, embracing the fields of physics, chemistry, physical chemistry, nutrition, bacteriology, physiology, and medicine, have relied upon the many unique properties of gelatine for advancing knowledge in innumerable ways. In fact, many basic concepts in these fields have been established by the systematic use of gelatine.

Such properties as gelatine's solubility, gel formation, optical clarity, protective colloid effects, amphoteric reactions, macromolecular size and colloid osmotic function have been useful to Research. Digestibility by acid, alkali and enzyme hydrolysis to its amino acid or peptide components, as well as gelatine's amino acids for experimental and practical nutrition in both animal and human fields, have been found of value.

For many years, the Knox Gelatine Company has endeavored through improved technology to make characterization data and experimental materials available to research workers for advancing scientific knowledge, whether directly or remotely related to the use of gelatine.

Out of this cooperation has developed much new information and expanded uses for gelatine in the fields of medicine, nutrition, photosensitive materials including X-ray and color photography, medical vehicles and encapsulating materials. Gelatine has pioneered, as well, the field of plasma volume expanders with new materials recognized especially for safety and effectiveness.

As Research has advanced the knowledge of gelatine protein, Knox Gelatine has kept pace in quality. In gelatines, there is no acceptable substitute for Knox.

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ALL PROTEIN • NO SUGAR

to be of special value to home economists in business; water users with special problems in home, farm, or business; laundries; appliance company and utility company service men; and others who frequently need to make routine water-hardness checks. There are sufficient reagents in a Speedy-Kit for fifty to one hundred tests, depending on water hardness.

Legion Utensils Company claims "1001 uses" for its new "Table Tilting" steam-jacketed kettle, a stainless steel, seamless, drawn kettle with a "truly ⅔ steam jacket." A sanitary, half open bead eliminates the dirt-catching soldered edge of a flat rim. The trunnion arms are mounted in the middle of the kettle body, and intermediate locking stops hold the kettle in several tilting positions. These kettles are said to conform to the strictest health regulations. A 4-qt. kettle has a 10-in. diameter and is 5 in. deep; a 40-qt. kettle is 16-in. in diameter, 14½ in. deep.

Another new *Legion* product is the VA Vacuum Pitcher, an all-stainless-steel vacuum coffee pitcher. The new pitcher follows traditional design but has a new feature—a seamless, drawn, stainless steel liner, which eliminates the inside wall seam that collects dirt. Other features include double-walled construction insulated to hold 140°F. temperature for 1½ hr. and a heavy hinged cover that opens to 180°F.

Luncheons selling for less than $1 are featured in *H. J. Heinz Company's* new folder, "Profit Plates." In its twelve pages are presented recipes and serving ideas based on individual and chef-size cans of a dozen Heinz hot plate luncheon varieties. Each item in the brochure is treated in terms of cost and profit per case and as many as a dozen ways to serve, garnish, or combine the food with other items. Each menu suggestion contains at least one hot dish.

Turkey Handbook, in a revised, enlarged edition, has been issued by the *National Turkey Federation* in conjunction with the National Restaurant Association. The handbook is designed for institutional dietitians, food buyers, and chefs, and includes detailed information on quality designations, portion cost, and ways to prepare and cut turkey for high yield.

Economics Laboratory has introduced a low-cost, stainless steel, electric control unit for detergents which is adaptable to any size diswashing machine. Called "Solumatic 20," the new unit measures compound concentration automatically and with flashing red, green, and white lights gives quick visual signals to the operator. The green light indicates that the solution is at proper concentration; the white signal indicates minimum strength with a need for compound to be added; the red signal shows that concentration has dropped below the desired setting. The unit uses less electricity than a 25-watt bulb. Engineered with a low-voltage circuit to eliminate the cost of expensive conduit and wiring, installation costs are also minimum.

The *Swartzbaugh Manufacturing Company's* "Ideal Mealmobile" is a new tray conveyor which delivers trays and plates of hot and cold food for eighteen to twenty-four persons. The unit holds removable and interchangeable pull-type warming drawers or refrigerator shelves, each affording space for two 9-in. plates and four side dishes or other utensils of equal size. Adjustable, removable, and interchangeable tray guides are supplied in two designs, one for the drawers and serving trays, the other for the shelves. Tray guides accommodate all sizes of trays up to 15¼ by 20½ in., and when removed leave the entire interior open for cleaning. Steam or any other cleaning method may be used, because there is no exposed wiring. All corners are rounded, and the heating section is fully insulated. The unit, made entirely of polished stainless steel, moves on 8-in., ball-bearing, rubber-tired wheels. Temperature control is automatic. Three models are now in production.

Wyandotte Chemicals Corporation in February began construction of a new plant in Los Nietos, California, to replace its present Los Angeles plant. The new operation will provide increased production and improved delivery for the entire Pacific Coast area. Buildings will contain research and technical service laboratories as well as manufacturing and shipping facilities and the district sales office. A complete line of public sanitation, maintenance cleaning, and germicidal products will be produced in the plant.

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